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#21 Supplemental Appeal Brief 10/24/01 DC

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Scott H. Hutchinson and Gregory M. Hanka	§	Serial No:	09/233,860
	§	Filed:	January 20, 1999
For: SOFTWARE-IMPLEMENTED METHOD FOR IDENTIFYING NODES ON A NETWORK	§	Group Art Unit:	2121
	§	Examiner:	William D. Thompson 703.305.0022
Atty Dkt: 23946-P001US	§		

Assistant Commissioner,
United States Patent & Trademark Office
Washington, DC 20231

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Date: 10.15.01 Signature D. Rypacek

Printed Name D. Rypacek

APPELLANT'S REPLY BRIEF

Sir:

This paper is submitted as a reply to the Examiner's Answer mailed August 13, 2001 ("the Answer") in connection with the appellate proceeding pending in the above-referenced patent application. No fees are believed to be due in connection with this submission. However, if any fees are determined to be due in connection with this submission, the Commissioner, Assistant Commissioner, and/or the Director of the U.S. Patent & Trademark Office are authorized to charge Winstead Sechrest & Minick Deposit Account No. 23-2426, referencing matter 23946-P001US.

(1) Status of Claims

The Answer notes that the statement of the status of claims in the Second Substitute Appeal Brief ("the Appeal Brief") submitted on May 16, 2001 in connection with the subject appeal was incorrect, in that the Appeal Brief stated that claims 1-3, 5-8, 9-13, 15-16, and 18-24 are pending in the application. Appellant acknowledges that the Appeal Brief indicated

pendancy of claim 9, which was canceled in "(Preliminary) Amendment A" submitted on June 11, 1999. The undersigned attorney Appellant apologizes for this typographical error, hereby acknowledging that it is claims 1-3, 5-8, 10-13, 15-16, and 18-24 which are on appeal.

(2) Summary of Invention

The Answer characterizes the Appeal Brief's summary of invention as "deficient because it is not directed to that which is actually recited in the claim [sic]." This characterization is respectfully challenged.

The Answer alleges that the following language from the Appeal Brief's summary of invention is "reading into the claims limitations, structure and functionality that is not present in the claims on Appeal":

> "The disclosed invention, therefore, involves a system whereby the efficacy of tracking a network node's NIC address is substantially augmented through the introduction of a protocol which accounts for unpredictable and otherwise untraceable changes in a component's NIC address."

It is submitted that the cited language from the Appeal Brief in no way mischaracterizes or overextends the claims on appeal. Claim 1, for example, recites in part "transmitting asset-management information concerning the node ***together with the current NIC address value*** and the former NIC address value" (emphasis added). This claim language clearly differentiates a NIC address from other "asset-management information," and thereby amply supports the Appeal Brief, which in summarizing the invention notes that the efficacy of the invention is augmented by transmission of asset-management information ***other than*** merely a NIC address. The Answer seems to suggest that only the claim language itself, to the exclusion of any clarifying explanatory verbiage, can be incorporated into an Appeal Brief's summary of the invention.

Regarding the Answer's characterization of the Appeal Brief's summary of invention as presenting "preemptive arguments," it is respectfully submitted that the Appeal Brief's summary of invention is in no way – nor was intended to be – argumentative. The Appeal Brief merely describes various features and aspects of the invention disclosed and claimed in the subject

application, with frequent citation to, and support by, the specification and claims of the application, referencing "the specification by page an line number." 37 C.F.R. § 1.192(c)(5). Acknowledging that the claims are the definitive "summary" of the invention, it is respectfully submitted that the Appeal Brief's summary of invention appropriately includes explanatory text beyond the claim language, intended to direct the Board to the claimed invention. The Answer's statement that "the summary as provided is not directed to the claim limitations as recited and on Appeal" (Answer, § 5) is respectfully but flatly refuted. Nothing in the Appeal Brief's summary of the invention describes or was intended to describing anything other than that which is recited in the claims on appeal.

Appellant is particularly concerned about the Answer's statement that "the root of the invention is to send configuration information from the node (computer) to a server that tracks changes in the node configurations over time." (*id.*) It is well established in the caselaw that "in determining obviousness, there is no legally recognizable or protected 'essential,' 'gist,' or 'heart' of the invention." W.L. Gore & Associates v. Garlock, Inc., 721 F.2d 1540 (Fed. Cir., 1983) (*cert denied*, 469 U.S. 851 (1984); *see also*, Bausch & Lomb, Inc. v. Barnes-Hind /Hydrocurve, Inc., 796 F.2d 443 (Fed. Cir., 1986) (finding that it is error to focus on a distilled "gist" or "core" of a patented invention). While the Answer purports "not to over simplify Appellant's invention," (*id.*) it is respectfully submitted that the characterization that "the instant invention collects data that is embodied in all computers and sends the information to a server that manages the nodes in a fashion that has been incorporated into standard protocols for such systems" (*id.*) does precisely that.

(3) Issues

The Answer states that "no arguments have been proferred, until the instant SECOND SUBSTITUTE APPEAL BRIEF, regarding the rejection under 35 U.S.C. § 112 para. four" and that therefore "this particular issue should be moot." (Answer, § 6). This allegation is respectfully challenged, inasmuch as the rejection of claims 11 and 12 under 36 U.S.C. § 112, paragraph 4 were ***expressly*** addressed in Appellant's "Amendment B and Response to Nov. 12,

1999 Office Action" ("Amendment B"). Specifically, Amendment B asserts that "[t]he rejections of claims 11 and 12 are respectfully traversed and their withdrawal is requested." (Amendment B, p. 6). Amendment B continues by discussing in detail the Federal Circuit's reversal of rejections substantially identical to the rejections of claims 11 and 12 in the instant application, citing In re: Warmerdam, 33 F.3d 1354 (Fed. Cir. 1994) for the proposition that "[t]here has been no showing that one skilled in the art would have any particular difficulty" in determining the scope of a claim drafted in similarly to claims 11 and 12 in the instant application." There is thus no basis for the Answer's assertion that Appellant's position with regard to the § 112 paragraph four rejections are "anew and should be moot." (Answer, § 7).

Appellant respectfully reiterates its position that claims 11 and 12 unquestionably ***do*** further limit the claims from which they depend, inasmuch as claims 11 and 12 recite "a program storage device," whereas the claims from which claims 11 and 12 depend recite methods "executed by a node on a network." One need only consider the requisites for infringement of claim 11 or 12 versus the requisites for infringement of any of the claims from which claims 11 and 12 depend. On the one hand, one must have "a program storage device" to infringe claims 11 or 12, whereas one needs to have "a node on a network... transmitting asset management information" in order to infringe the claims from which claims 11 and 12 depend.

In its extensive articulation of the rejection of claims 11 and 12, the Office Action states that "[c]laims 11 and 12 are, at best, a mix and match of independent and dependent claims provided in a multiplicity of forms with multiple claims spanning method and program product claim constructs with differing and similar claim limitiation." (Answer, p. 16). Throughout this discussion, the Answer suggests that claims 11 and 12 are inclusive of ***all*** claims to which they respectively refer. Such an interpretation seems to completely overlook the limitation "a specified ***one*** of" found in both claim 11 and claim 12. The Answer's interpretation seems to read claims 11 and 12 as replacing "a specified one of" with "***each*** of;" Appellant concedes that were such replacement language used in claims 11 and 12, those claims might indeed suffer from the indefiniteness the Answer alleges. The language of claims 11 and 12, however, prohibits this interpretation.

(4) Other Rejections

The Answer reasserts prior § 112 rejections and prior § 102 rejections based upon *de la Salle* and *Barroux*. Appellant hereby respectfully incorporates by reference herein and reasserts the positions asserted in all prior Responses of record in the instant application refuting these rejections.

* * * * *

CONCLUSION

Appellant continues to believe that each of the pending claims in the present application recites subject matter neither taught nor suggested by the prior art, that the claims are in conformance with all applicable statutory requirements, and that the application as a whole is in proper form and condition for allowance. Reconsideration and withdrawal of the objections and rejections is therefore requested, such that the application may advance to issue at the earliest possible date. If the Examiner believes that the application can be place in even better condition for allowance, he is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Date: 15-OCT-2001

Hugh R. Kress
Reg. No. 36,574
WINSTEAD SECHREST & MINICK, P.C.
2400 Bank One Center
910 Travis Street
Houston, Texas 77002
(713) 650-2714(voice)
(713) 650-2400 (fax)

ATTORNEY FOR ASSIGNEE

HOUSTON_1\522607\1
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APPENDIX A

1. A method, executed by a node on a network, said node comprising at least one asset, of transmitting asset-management information about the node, the method comprising:

(a) determining a current address value of a network interface card of the node, referred to as a NIC address value;

(b) retrieving, from a data storage at the node, a former NIC address value for the node; and

(c) transmitting asset-management information concerning the node together with the current NIC address value and the former NIC address value.

2. The method of claim 2, wherein determining the current NIC address value includes an attempt to detect the then-current NIC address value.

3. The method of claim 2, wherein the attempt to detect the then-current NIC address value is unsuccessful, and further comprising (i) retrieving, from a data storage at the node, a stored value containing the result of the past live detection of the then-current NIC address value, referred to as a previously-detected NIC address value; and (ii) transmitting the previously-detected NIC address value.

4. (previously canceled)

5. The method of claim 1, wherein the NIC address value comprises a signature portion and a pseudorandomly generated portion.

6. The method of claim 1, wherein the former NIC address value is redundantly stored in multiple partitions within the data storage at the node.

7. The method of claim 6, wherein (x) each copy of the former NIC address value is associated with a timestamp, and (y) retrieving the former NIC address value comprises retrieving the respective copy associated with the most recent timestamp.

8. A method, executed by a server node on a network, for recording, in a database, asset-management information about a client node, comprising:

(a) retrieving, from the client node, (1) asset-management information about the client node, (2) a current address value of a network interface card of the client node, referred to as a current NIC address value and (3) a former NIC address value for the client node that is equal to the current NIC address value;

(b) unsuccessfully attempting to locate, in the database, a record corresponding to the current NIC address value;

(c) unsuccessfully attempting to locate, in the database, a record corresponding to the former NIC address value; and

(d) storing the asset-management information, the current NIC address value, and the former NIC address value in a record in the database associated with the current NIC address value.

9. (previously canceled)

10. The method of claim 8, wherein the NIC address value comprises a signature portion and a pseudorandomly generated portion.

11. A program storage device readable by a processor in the client node of a specified one of claims 1 through 3, 5 through 7, and 21 through 24, and encoding a program of instructions including instructions for performing the operations recited in the specified claim as being performed by the client node.

12. A program storage device readable by a processor in the server node of a specified one of claims 8, 10, and 24 and encoding a program of instructions including instructions for performing the operations recited in said specified claim as being performed by the client node.

13. In a node on a network, a data store comprising a machine-readable data structure accessible to a processor in the node and containing node-identification information for the client node that includes (i) a current network interface card value for the node, referred to as a NIC address value, and (ii) a former NIC address value.

14. (previously canceled)

15. The data store of claim 13, wherein the NIC address value that constitutes the current node-identifier value includes a signature portion and a pseudorandomly generated portion.

16. In a node on a network, a data store comprising:

(a) a plurality of machine-readable data structures accessible to a processor in the node;

(b) each said data structure containing node-identification information for the client node that includes (i) a current node-identifier value, and (ii) a former node-identifier value, each said value comprising a network interface card address value, referred to as a NIC address value;

(c) each said data structure being associated with a timestamp.

17. (previously canceled)

18. The data store of claim 16, wherein the NIC address value comprises a signature portion and a pseudorandomly generated portion.

19. In a server node on a network, that includes a client node, a machine-readable data structure accessible to a processor in the server node, comprising (i) a current value of a network interface card address for the client node, referred to as a current NIC address value for the client node, (ii) a former NIC address value for the client node, and (iii) asset-management information about the client node.

20. The machine-readable data structure of claim 19, wherein the current NIC address value comprises a signature portion and a pseudorandomly generated portion.

21. A method, executed by a node on a network, of transmitting asset-management information about the node, the method comprising:

(a) determining a current node identifier value, where (1) the node identifier value for any particular node in the network is dependent upon one or more node-identification attributes of that node including an address value of a network interface card in the node, referred to as a NIC address value, and (2) determining the current node identifier value includes an attempt to detect the then-current values of said one or more node-identification attributes;

(b) retrieving, from a data storage at the node, a former node identifier value for the node; and

(c) transmitting asset-management information about the node together with the current node-identifier value and the former node identifier value.

22. The method of claim 21, wherein the attempt to detect said one or more node-identification attributes fails to detect at least one of said node-identification attributes, and further comprising (i) retrieving, from a data storage at the node, a stored value containing the result of a past live detection of the said one or more node-identification attributes, referred to as a previously-detected node identifier value; and (ii) transmitting the previously-detected node identifier value.

23. A method, executed by a node on a network, of transmitting asset-management information about the node, the method comprising:

(a) attempting but failing to detect a current network interface card address value for the node, referred to as a current NIC address value;

(b) retrieving, from a data storage at the node, a previously-detected NIC address value;

(c) retrieving, from a data storage at the node, a stored value of a former NIC address value for that node; and

(d) transmitting the asset-management information together with the previously-detected NIC address value and the former NIC address value.

24. A method, executed by a client node and a server node on a network, for recording, in a database, asset-management information about the client node, comprising:

(a) the client node (1) determining a current address value of a network interface card in the node, referred to as a NIC address value, (2) retrieving, from a data storage at the node, a former NIC address value for the node, and (3) transmitting to the server node asset-management information, the current NIC address value, and the former NIC address value;

(b) the server node (1) unsuccessfully attempting to locate, in the database, a record corresponding to the current NIC address value, (2) locating, in the database, a record corresponding to the former NIC address value, (3) recording the asset-management information in said record, and (4) updating the record to correspond to the current NIC address value instead of the former NIC address value.

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 20

Application Number: 09/233,860
Filing Date: January 20, 1999
Appellant(s): Scott H. Hutchinson and Gregory M. Hanka

Hugh R. Kress
For Appellant

EXAMINER'S ANSWER

This is in response to Appellant's Second Substitute Brief on Appeal filed May 16, 2001.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief. Specifically, the real party of interest in this Appeal is BindView Development Corporation, a Texas corporation. Further, Appellant has elected under 37 C.F.R. § 3.71 to prosecute the Application to the exclusion of the inventors.(Paper 9)

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is not correct.[paper 7, 15, and 19, captioned section C. Status of Claims] **Examiner has attempted twice to have Appellant correct this error to no avail.** Specifically, claims 1-3, 5-8, 10-13, 15, 16, 18-24 are on Appeal since claims 4, 9, 14 and 17 have been cancelled.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Invention

The summary of invention contained in the brief is deficient because it is not directed to that which is actually recited within the claim. Specifically, Applicant is stating in summary that the invention is directed to "The disclosed invention, therefore, involves a system whereby the efficacy of tracking a network node's NIC address is substantially augmented through the introduction of a protocol which accounts for unpredictable and otherwise untraceable changes in a component's NIC address." (Pages 2-3, Summary of the Invention, SUBSTITUTE APPEAL BRIEFs, papers 7, 15 and 19) Further, Appellant is reading into the claims limitations, structure and functionality that is not present in the claims on Appeal. Lastly, Appellant has provided preemptive arguments that do not lend themselves to directing the Board to the claimed invention.

Therefore, the summary as provided is not directed to the claim limitations as recited and on Appeal. Appellant's specification recites that the instant invention is directed to an asset management system with an auditing feature that allows the system to provide attributes regarding software and/or software configuration of the node that tend to be unique within a given network. A NIC address is considered a reliable identification. In the alternative, for example in an Internet environment, the NIC address may not be used. The auditing mechanism is an agent running on the client and server nodes to provide information about the node to the other. Alternately, an audit command can be initiated from the server to the node to elicit the information. Appellant's specification and claims are directed to aforementioned and the use of an agent to provide a server

with both asset management information and two NIC addresses (current and past). (Appellant's specification line 11, page 4 - line 12, page 5, page 14, line 15 - page 22, line 23).

Exemplary recitation of the claim as supported is directed to a method, executed by a node on a network, where the node comprises at least one asset, of transmitting asset-management information abut the node, the method determining a current address value of a network interface card of the node, referred to as a NIC address value, retrieving from a data storage at the node a former NIC address value for the node and transmitting asset management information concerning the node together with the current NIC address value and the former NIC address value.(Claim 1) Therefor, not to over simplify Appellant's invention, but the root of the invention is to send configuration information from the node (computer) to a server that tracks changes in the node configurations over time. This is to say the instant invention collects data that is embodied in all computers and sends the information to a server that manages the nodes in a fashion that has been incorporated into standard protocols for such systems.

(6) Issues

The Appellant's statement of the issues in the brief are partially correct. Specifically, claims 1-3, 5-8, 10-13, 15, 16, 18-24 are on Appeal since claims 4, 9, 14 and 17 have been cancelled. **Examiner has attempted twice to have Appellant correct this error to no avail.**

No arguments have been proffered, until the instant SECOND SUBSTITUTE APPEAL BRIEF, regarding the rejection under 35 U.S.C. § 112 para. four. Therefore, this particular issue should be moot.(papers 7, 15, and 19, captioned sections F. ISSUES subparagraph (a) and (c), H. Argument, indented subsection 2.)

(7) Grouping of Claims

The rejection of claims 1-3, 5-8, 9-13, 15-16 and 18-24 stand or fall together because Examiner agrees that the grouping is partially correct for Appeal. Claim grouping is based on Appellant's prior arguments and includes only those claims remaining in the case to appeal.

Specifically, claims 1-3, 5-8, 10-13, 15, 16, 18-24 are on Appeal since claims 4, 9, 14 and 17 have been cancelled. **Examiner has attempted twice to have Appellants correct this error to no avail.** [papers 7, 15, and 19, captioned section entitled G. Grouping of Claims]

Appellant has not previously argued the issue of the rejection based on 35 U.S.C. § 112 para. four. Examiner has lumped the 1st and 2nd apparent groupings of Appellant into Group 1. This is proper since they have only been argued together. Further, Appellant has not previously

argued the 112 paragraph four issues at all. This argument is anew and should be moot. See 37 CFR § 1.192(c)(7).

GROUP I: Claims 11-12.

GROUP II: Claims 1-3, 5-8, 10-13, 15, 16, 18-24.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is not correct. Claim 2 is dependent on Claim 2. Examiner has attempted to have Appellant correct this to no avail. This is not representative of the claims pending in the case. This is presumed a typographic error. Moreover, claims 1-3, 5-8, 10-13, 15, 16, 18-24 are on Appeal since claims 4, 9, 14 and 17 have been cancelled.

(9) Prior Art of Record

The following is a listing of the prior art of record relied upon in the rejection of claims under appeal.

5,878,420	de la Salle	3-1999
5,923,850	Barroux	7-1999

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

GROUP I: Claims 11 and 12 are rejected under 35 U.S.C. 112 paras. two and four. This rejection is set forth in prior Office action, Paper No. 8 and Paper No. 6.

GROUP II: Claims 1-3, 5-8, 10-13, 15, 16, 18-24 are rejected under 35 U.S.C. § 102(e). This rejection is set forth in prior Office action, Paper No. 8.

GROUP I

Claim Rejections - 35 U.S.C. § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 11 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims are written in a manner that does not distinguish them as either method or computer readable medium, but rather some type of hybrid wherein the computer readable medium cannot be clearly correlated to specific method steps. "A program storage device readable by a processor in the node of a specified one of claims 1 through 3, 5 through 7, and 21 through 24, and encoding a program of instructions including instructions for performing the operations recited in said specified claims" and "A program storage device readable by a processor in the server

node of a specific one of claims 8, 10 and 24 and encoding a program of instructions including instructions for performing the operations recited in said specified claims" are unclear because a program storage device readable by a processor and encoding a program of instructions for performing the operations cannot be clearly correlated to the method steps. Further, the issue of which grouping of independent and dependencies that are within the claims is actually being recited is obscure. In the last line the addition of the words, " in said specified claims ever further obscures the meaning. The examiner is left to speculate to the intended meaning of these claims.

The following is a quotation of the forth paragraph of 35 U.S.C. 112:

> Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim shall in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

Claims 11 and 12 are rejected under 35 U.S.C. 112, forth paragraph, for failing to further limit the claim that each depends from. "A program storage device readable by a processor in the node of a specified one of claims 1 through 3, 5 through 7, and 21 through 23, and encoding a program of instructions including instructions for performing the operations recited in said specified claims" and "A program storage device readable by a processor in the server node of a specific one of claims 8 and 10 and encoding a program of instructions including instructions for performing the operations recited in said

specified claims" imply the same scope relative to the claims to which each depends. In other words, where ever a dependent claim recites the same limitations within a group of claims that does not expressly provide a new limitation the dependent claim does not further limit the claims to which each dependent claim refers.

GROUP II

Claim Rejections - 35 U.S.C. § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C.§ 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> > (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 1-3, 5-8, 10-13, 15, 16, 18-24 are rejected under 35 U.S.C. § 102(e) as being clearly anticipated by Barroux or de la Salle.

Taking claim 1, for example, Barroux and de la Salle disclose:

determining a current address value of a network interface card of the node, referred to as a NIC address value, retrieving form a data storage at the node, a former NIC address value for the node and transmitting asset management information concerning the node together with the current NIC address (MAC address, present configuration). and the former NIC address (MAC address for prior configuration).

As to claim 2, the method of claim 1, wherein determining the current NIC address includes an attempt to detect the then current NIC address value (MAC address).

As to claim 3, the method of claim 2, wherein the attempt to detect the current NIC address value is unsuccessful, and further comprising:

retrieving, from a data storage at the node, a stored value containing the result of the past live detection of the then-current NIC address value (current MAC address) referred to as a previously detected NIC address value (last MAC address); and transmitting the previously detected NIC address value (last MAC address) as taught throughout Barroux and de la Salle. (Barroux: SNMP Probe, MAC address, ifPhysAddress object; de la Salle: Board address Object and probe)

Claim 5 recites providing the NIC address value comprises a signature portion and a pseudo randomly generated portion which is the industry standard for generating the MAC addresses stored within the MAC address pool as taught throughout Barroux and de la Salle.(Barroux: SNMP Probe, MAC address, ifPhysAddress object; de la Salle: Board address Object and probe)

Claim 6 recites the use of redundant storage as taught throughout Barroux and de la Salle.(Barroux: SNMP Probe, MAC address, ifPhysAddress object; de la Salle: Board address Object and probe)

Claim 7 recites the use of a time stamping to determine the last NIC address assigned as taught throughout Barroux and de la Salle.(Barroux: SNMP Probe, MAC address, ifPhysAddress object; de la Salle: Board address Object and probe)

As to claim 13, recites in a node on a network, a data store comprising a machine readable data structure accessible to a processor in the node and containing node-

identification for the client node that includes a current network interface card value for the node, referred to as a NIC address value and a former NIC address value as taught throughout Barroux and de la Salle (Barroux: SNMP Probe, MAC address, ifPhysAddress object; de la Salle: Board address Object and probe)

Claims 8, 13, 16, 19, 21-24 are rejected for the same reasoning as claims 1-3 and 6-7, set forth above, *supra.*. Claims 8, 16, 19, 21-24 contain the same limitations as the equivalent claims 1-3 and 6-7 and as taught throughout Barroux and de la Salle.

Claims 10, 15, 18 and 20 are rejected for the same reasoning as claim 5, set forth above, *supra.*. Claims 10, 15, 18 and 20 contain the same limitations as recited in claims 10, 15, 18 and 20 and as taught throughout Barroux and de la Salle.

As for claims 11 and 12 are rejected for the same reasoning as the claims to which they respectively depend, claims 1 through 3, 5 through 7 and 21 through 24 and 8, 10 and 24, respectively, as set forth above, *supra.*. Claims 11 and 12 are interpreted as merely the equivalent computer-readable medium claims containing the same limitations as claims 1 through 3, 5 through 7 and 21 through 23 and 8 and 10, respectively, as taught throughout Barroux and de la Salle. Claims 11 and 12 have been interpreted based on the presumption that every possible combination and redundancy is taught in the prior art applied since either reference teach the embodied invention as

claimed in the proper claims. In general, as pointed out in the rejection of claims 11 and 12 they are indefinite in their nature and impossible to exact a meaningful interpretation.

(11) Response to Argument

Examiner provides response based on the grouping of claims I and II, to Appellant's arguments. Appellant has addressed their arguments for Group I within indent sections 1 and 2 (pages 5-8) and Group 2 within indent sections 3 and 4 (pages 8-18):

GROUP I

As can be seen from the prosecution history, Appellant has been silent on the rejection of claims 11 and 12 under 35 U.S.C. § 112 paragraph four, thereby conceding to the rejection. The arguments now presented in the instant Substitute Brief directed to this issue are not timely, late coming, an after thought and therefor moot.

Examiner rejected claims 11 and 12 under 35 U.S.C. § 112 paragraph two as being indefinite in nature. The root of this issue lay within the construction Appellant had defined anew and which yields an abundance of probable claims, and redundant and/or circular claim limitations thereby rendering the claims indefinite in nature. Appellant has not provided claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Appellant's representative has asserted the position that *In re Warmerdam* (*Warmerdam*) can be used to overcome the rejection. Examiner respectfully disagrees. The facts in *Warmerdam* are similar and so is the beginning claim language and structure, however, merely being similar in there nature does not mean they are equivalent in their nature. Specifically looking at the claim language of *Warmerdam*:

> "A machine having a memory which contains data representing a bubble hierarchy generated by the method of any of Claims 1 through 4."

Now take Appellant's claim 11 language:

> "A program storage device readable by a processor in the client node of a specified one of claims 1 through 3, 5 through 7, **and** 21 through 24, **and** encoding a program of instructions including instructions **for performing the operations recited in the specified claim** as being performed by the client node" [emphasis added]

As can be plainly seen, the language and the constructs are very different and require a completely different interpretation of the language. The applicants language of "of a specified one of claims 1 through 3" is within the practice and interpretation of the *Warmerdam* decision.

However, that is where the similarity ends. Specifically, Appellant continues then uses language separated with a "," and then a new series of claims "5 through 7", the conjunctive "**and**" and then finally a new series of claims "21 through 24". Appellants have then added further limitations to the claims with "**and** encoding a program of

instructions including instructions for performing the operations **recited in the specified claim** as being performed by the client node".

Examiner proffers that this is not within the scope, meaning and reasonable interpretation of *In re Warmerdam* decision. Further, the additional limitations provide an ambiguity to the claim language in a way as to make proper and reasonable interpretation of the language impossible.

Appellant has stated in FN[2], of Substitute Brief, page 6, that the nature of claims 11 and 12 are Markush-type claims. Looking to *Ex parte Markush, 1925, C.D. 126,* the nature of the claims do not present as genus and subgenus, are not mixtures of chemical compounds and not recited in the accepted manner of stating that the it is "**selected from the group consisting of A, B and C**." *Ex parte Markush* sanctions claiming a genus expressed as a group consisting of certain specified materials. Inventions in metallurgy, refractories, ceramics, pharmacy, pharmacology and biology are most frequently claimed under the Markush formula but purely mechanical features or process steps may also be claimed by using the Markush style of claiming. *See Ex parte Head, 214 USPQ 551 (Bd. App. 1981); In re Gaubert, 524 F.2d 1222, 187 USPQ 664 (CCPA 1975); and In re Harnisch, 631 F.2d 716, 206 USPQ 300 (CCPA 1980).* It is *improper to use the term* "**comprising**" instead of "consisting of." *Ex parte Dotter, 12 USPQ 382 (Bd. App. 1931).* MPEP states: "The use of Markush claims of diminishing scope should not, in itself, be

considered a sufficient basis for objection to or rejection of claims. However, if such a practice renders the claims indefinite or if it results in undue multiplicity, an appropriate rejection should be made." In the instant case, it is seen that Appellant has divested them self from using the standard and accepted practice that makes as claim a Markush-type. Further the groups in a Markush claim are products, compounds or process steps not claims. This is a multi dependent structure. The claims are indefinite in their nature and therefore, even if they met this standard, they would be properly rejected.

Claims 11 and 12 are, at best, a mix and match of independent and dependent claims provided in a multiplicity of forms with multiple claims spanning method and program product claim constructs with differing and similar claim limitations. These are not in the structure or spirit of Markush-type claims. This is an attempt, in a single claim structure, to claim all possible permutations of claim features and/or limitations. This provides a confused assortment of claims, limitations and redundancies. There is not a safe harbor for this formulary of claim language in the Markush type claims.

Taking claim 11 to heart, an exemplarily construct using Appellants' claims can result in a number of permutations that are improper constructions and redundant in nature. A large number of permutations are possible, I have provided only two:

Claim 11 (version 1)

A program storage device readable by a processor in the client node of a specified one of claim 2 and claim 7 and claim 21 ***[examiner selected one claim from each grouping to yield one composite set of limitations]*** and encoding a program of instructions including instructions for performing the operations recited in the specified claim ***[perhaps 2, maybe 7, alternately we might be talking about 21]*** as being performed by the client node. [Emphasis added]

Analysis of claim 11 (dependent or independent) is obscure at best.

> Claim 11 provides for a program storage device readable by a processor in the client node of claim 2, a method dependent on claim 1, wherein determining the current NIC address value includes an attempt to detect the then-current NIC address value **AND** claim 7, the method dependent on dependent claim 6, which is in turn is dependent on claim 1, wherein (x) each copy of the former NIC address value is associated with a time stamp, and (y) retrieving the former NIC address value comprises retrieving the respective copy associated with the most recent time stamp **AND** independent claim 21, a method, executed by a node on a network, of transmitting asset-management information about the node, the method comprising:
>
> (a) determining a current node identifier value, where (1) the node identifier value for any particular node in the network is dependent upon one or more node-identification attributes of that node including an address value of a network interface card in the node, referred to as a NIC address value, and (2) determining the current node identifier value includes an attempt to detect the then-current values of said one or more node-identification attributes;
>
> (b) retrieving, from a data storage at the node, a former node identifier value for the node; and
>
> (c) transmitting asset-management information about the node together with the current node-identifier value the former node identifier value
>
> the method of claim 1, wherein the former NIC address is redundantly stored in multiple partitions within the data storage at the node and
>
> encoding a program of instructions including instructions for performing the operations recited in the specified claim 2, a method dependent on claim 1, wherein determining the current NIC address value includes an attempt to detect the then-current NIC address value **OR** claim 7, the method dependent on dependent claim 6, wherein (x) each copy of the former NIC address value is associated with a time stamp, and (y) retrieving the former NIC address value comprises retrieving the respective copy associated with the most recent time

> stamp **OR** independent claim 21, a method, executed by a node on a network, of transmitting asset-management information about the node, the method comprising:
>
> (a) determining a current node identifier value, where (1) the node identifier value for any particular node in the network is dependent upon one or more node-identification attributes of that node including an address value of a network interface card in the node, referred to as a NIC address value, and (2) determining the current node identifier value includes an attempt to detect the then-current values of said one or more node-identification attributes;
>
> (b) retrieving, from a data storage at the node, a former node identifier value for the node; and
>
> (c) transmitting asset-management information about the node together with the current node-identifier value the former node identifier value as being performed by the client node.

Examiner has interpreted the phrase "for performing the operations recited in the specified claim as being performed by the client node" as an **OR** however, one could just choose one of the claims 2, 7 or 21. The resulting claim 11 yields a depend claim 2 with an dependent claim 7 attached to an independent claim that neither 2 or 7 are dependent upon. Functionally, this would mean to interpret claim 11 would include all the limitations as recited in claim 1, 2, 6, 7 and 21 with redundant limitations throughout two independent claims and limitations provided in as dependencies that are separate from the merged independent claim. Further, providing additional claim limitations and the folding back in of limitations recited in claim 1 and 2, 6 and 7, or 21 renders the claims indefinite. Interpreting this claim for determination of patentability is very difficult, if not impossible. This appears well outside a reasonable interpretation of *Warmerdam*.

Claim 11 (version 2)

A program storage device readable by a processor in the client node of a specified one of claim 1 and claim 7 and claim 21 ***[examiner selected one claim from each grouping to yield one composite set of limitations]*** and encoding a program of instructions including instructions for performing the operations recited in the specified claim ***[perhaps 1, maybe 7, alternately we might be talking about 21]*** as being performed by the client node. [Emphasis added]

> Claim 11 provides for a program storage device readable by a processor in the client node of claim 1, a method, executed by a node on a network, said node comprising at least one asset, of transmitting asset-management information about the node, the method comprising:
>
> (a) determining a current address value of a network interface card of the node, referred to as a NIC address value;
>
> (b) retrieving, from a data storage at the node, a former NIC address value for the node; and
>
> (c) transmitting asset-management information concerning the node together with the current NIC address value and the former NIC address value **AND** claim 7, the method dependent on dependent claim 6, wherein (x) each copy of the former NIC address value is associated with a time stamp, and (y) retrieving the former NIC address value comprises retrieving the respective copy associated with the most recent time stamp **AND** independent claim 21, a method, executed by a node on a network, of transmitting asset-management information about the node, the method comprising:
>
> (a) determining a current node identifier value, where (1) the node identifier value for any particular node in the network is dependent upon one or more node-identification attributes of that node including an address value of a network interface card in the node, referred to as a NIC address value, and (2) determining the current node identifier value includes an attempt to detect the then-current values of said one or more node-identification attributes;
>
> (b) retrieving, from a data storage at the node, a former node identifier value for the node; and
>
> (c) transmitting asset-management information about the node together with the current node-identifier value the former node identifier value depend claim 6 , the method of claim 1, wherein the

> former NIC address is redundantly stored in multiple partitions within the data storage at the node and
>
> encoding a program of instructions including instructions for performing the operations recited in the specified independent claim 1, a method, executed by a node on a network, said node comprising at least one asset, of transmitting asset-management information about the node, the method comprising:
>
> (a) determining a current address value of a network interface card of the node, referred to as a NIC address value;
>
> (b) retrieving, from a data storage at the node, a former NIC address value for the node; and
>
> (c) transmitting asset-management information concerning the node together with the current NIC address value and the former NIC address value **OR** dependent claim 7, the method dependent on dependent claim 6 depend on method of claim 1, wherein the former NIC address is redundantly stored in multiple partitions within the data storage at the node and, wherein (x) each copy of the former NIC address value is associated with a time stamp, and (y) retrieving the former NIC address value comprises retrieving the respective copy associated with the most recent time stamp **OR** independent claim 21, a method, executed by a node on a network, of transmitting asset-management information about the node, the method comprising:
>
> (a) determining a current node identifier value, where (1) the node identifier value for any particular node in the network is dependent upon one or more node-identification attributes of that node including an address value of a network interface card in the node, referred to as a NIC address value, and (2) determining the current node identifier value includes an attempt to detect the then-current values of said one or more node-identification attributes;
>
> (b) retrieving, from a data storage at the node, a former node identifier value for the node; and
>
> (c) transmitting asset-management information about the node together with the current node-identifier value the former node identifier value as being performed by the client node.

This claim 11 is even more interesting in that it contains two independent and two dependent claims. Claims 6, 7 are not dependent on the independent claim 21. Functionally, this would mean to interpret claim 11 one would include all the limitations as recited in claim 1, 6, 7 and 21 with redundant limitations throughout two independent claims and limitations provided in dependencies that are separate

from the merged independent claim. Further, providing additional claim limitations and then folding back in of limitations recited in claim 1, 6 and 7, or 21 renders the claim indefinite. Interpreting this claim for determination of patentability is difficult, if not impossible. This appears well outside a reasonable interpretation of *Warmerdam* as well.

Claims 11 and 12 can be both independent and dependent in their individual natures. Taking claim 11 with 2, 7 and 22 yields a possible dependent claim with all limitations inclusive. Alternately, taking claim 11 with 1, 5, and 24 result in a mixed mode of independence and dependencies that can possibly looked at as an independent claim with composite limitations from two independent claims plus the dependent claim limitations.

Therefore the language as applicant has provided is clearly indefinite in nature and defective. Claim 12 is constructed in the same fashion and therefor has the same ambiguities, is indefinite and defective.

In response to the allegation that these types of claim constructs are not indefinite, the Examiner proffers that any person that is skilled in the art or of ordinary skill level would have a particularly difficulty time, if not impossible time, in determining whether or not that person was infringing upon any one of the permutations of the claim language that could be reasonably inferred from the

ambiguous language as applicant has claimed.(Paper 7) Lastly reducing these permutations to practice would be equally as difficult, if not impossible to the person of ordinary skill level in the art.

Examiner will also point out that there are functional and procedural difficulties Appellant's style of claim language provides. Firstly, the claim 11 can not be examined, allowed or rejected in total. The mere use of this format makes rejecting and allowing sub-parts difficult if not impossible. **Appellants merely needed to restate the claims in conventional independent and dependent form to make them individually and/or together allowable or rejectable in view of the art of record**.(restated for clarity) (Papers 6,8)

Though a fee has been charged for multiple dependent claim language, no fee has been levied on the number of possible permutations of claims to be Examined. Further, there is no fee to cover the redundancies when such claims are constructed as Appellant has argued as correct in their individual nature.

Appellant's construction deviates from the standard method of claiming multiple dependent claims and causes new issues when attempting to interpret the proper scope and limitations of the claim language as currently proffered as acceptable. Taking this approach the claim 11 that includes claims 2, 7 and 21 yield an improper multiple dependent construction, since the claims are not recited in the

alternative. Examiner does not agree with the applicants' opining that claims 11 and 12 are " also a 'good thing' on policy grounds because they promote judicial economy. Such claim constructs can be asserted against a vender of 'infringing' software as a direct infringer without the patent owner to prove the extra elements required for active inducement of infringement or contributory infringement. Such claims therefore help conserve resources, both for litigants and for the judicial system". (Paper 7) This is without merit and is a mere allegation since it is without evidence. Further, Appellant's approach causes a more protracted and difficult prosecution of the instant invention. This process provides no more than a manner in which to ensure the instant invention in prosecution outside the bounds of normal endeavors. The claim construction provides claims that are indefinite and places an undue burden on the Examiner.

Examiner proffers that, infringement or interference determinations (two or one way test) would be impossible if Appellant's style of claim language were used. Appellant's style makes determining the distinctions between inventions or products and the claims within the case difficult if not impossible.

Claims 11 and 12 appear to be an attempt at constructing new hybrid claims that are a merging of *In re Warmerdam, 33 F.3d 1354 (Fed. Cir. 1994)* and *In re Beauregard (CA FC) 35 USPQ2d 1383(1995)* claim constructs. The morphed claim

construction has resulted in indefinite claim language. The language does not appear to represent a program-by-process or a program storage device, yet an apparatus with method steps. Examiner directs Appellant to *Ex parte Lyell, 17 USPQ 2nd 1548 (Bd. Pat. App. & Inter. 1990)* which seems very relevant in that claims 11 and 12 recite a **program storage device** and then **integrate method steps**. As recited from the MPEP 2173.05(p): "A single claim which claims both an apparatus and the method steps of using the apparatus is indefinite under 35 U.S.C.§ 112, second paragraph." *Ex parte Lyell, 17 USPQ2d 1548 (Bd. Pat. App. & Inter. 1990)*, Further, see *Cyrix Corp. V. Intel Corp. (DC Texas) 32 USPQ2d 1890 (1/21/1994).*

Lastly, the examining procedures do not provide for handling such claim language, as Appellant have proffered as acceptable practice. Primarily, since the style in which Appellant is relying upon is not accepted practice there is no direction except that it is indefinite and improper in its nature. Examiner can not separate the claims to provide applicants with claims that can be dissected for rejection and/or allowance. Claim 12 has the same problems of including the conjunctive "and" between the individual selection of a specified one of claims 8, 10, and 24 with the conjunctive of "and" then "encoding a program of instructions including instructions for performing the operations recited in said specified claim ***(8 or 10 or 24)*** as being performed by the client node. Examiner has used the examples afore to outline the

difficulty associated with examining such claim constructions. Claim 12 has the same problems associated with claim 11.

Appellant has further argued that formulations of claims 11 and 12 is undeniably precedented.(Page 7, Substitute Brief) The examiner can only note that FN[3] provides for differing search terms that are not present in the claim constructs (see Appendix A). Further, the issue of indefiniteness is not hinged on either term as searched. As to the issue of whether issued U.S. Patent No. 5,860,929 (claims 11 , 19 and 20) provides support for this assertion, the Examiner can only direct the Appellant to MPEP 1701 section entitled: **Office Personnel Not To Express Opinion on Validity or Patentability of Patent**, which states:

> Every patent is presumed to be valid. 35 U.S.C. 282, first sentence. Public policy demands that every employee of the Patent and Trademark Office refuse to express to any person any opinion as to the validity or invalidity of, or the patentability or unpatentability of any claim in any U.S. patent, except to the extent necessary to carry out
>
> (A) an examination of a reissue application of the patent,
>
> (B) a reexamination proceeding to reexamine the patent, or
>
> (c) an interference involving the patent.
>
> The question of validity or invalidity is otherwise exclusively a matter to be determined by a court. Members of the patent examining corps are cautioned to be especially wary of any inquiry from any person outside the Patent and Trademark Office, including an employee of another Government agency, the answer to which might indicate that a particular patent should not have issued.

For the above reasons, it is believed that the rejections should be sustained.

GROUP II

Appellant's have charged that both of the cited references assume away the very essence of the problem to which the present invention is directed. Further, the present invention is directed to an asset management system for a computer network with a key feature of having the ability to **uniquely identify** each **node** on the **network**. Appellant has proffered that "Table 1 embodies a comparison between possible identifiers for a node (computer) and that the **only one attribute** -- one that **has not found widespread acceptance** among computer equipment manufactures -- was not susceptible to failure as a **node identifier**."

Appellant has opined that in the cited references, on the other hand, the existence of **unique identifiers** for **network nodes** is **not discussed**; rather, **it is assumed**. That the cited references completely ignore the problem sought to be solved by the present invention, and indeed take as their respective fundamental premises that such a problem does not exist. As a result each cited reference fails to teach or suggest critical elements of the claimed invention.

Examiner has a number of fundamental issues to bring forward in regards to Appellant's initial statements. Firstly, the basis for Appellant's claimed invention is spelled out as an asset manager which collects and sends asset information with historical data representing the current NIC address and the former NIC address. The

unique identifiers for network nodes as stated within Appellant's specification is in fact the NIC address which is defined as the MAC address located in network cards. In any given installation (network), it is safe to assume that all NIC addresses are unique. (Page 10, lines 5-10) A node's NIC address represents a reliable client node 101 identification method. The caveat, however , is that network interface card movements must be tracked somehow. The node-identifier records 305 and the central database provide tools that can be used in such auditing. (Page 15, lines 21-24) The system uses an audit command that triggers the client node to send to a server the history of the node with any changes that may have occurred, including the MAC address - alternately labeled the NIC address.

The prior art references explicitly teach using **unique identifiers** for nodes on a network with a manager that sends a "probe" function, or alternately uses an agent, to send collect historical information pertaining to the attributes, configurations and hardware located at the node. Both teachings discloses various possible **unique identifiers** including the MAC address (NIC address) and related information from the node. Alternately they disclose using an assigned **unique identifier** separate from the MAC address. It is noted that Appellant also provides such an alternate embodiment. The prior art is using underlying protocols with adaptations to solve the same problem that Appellant has argued as novel.

Appellant has attempted to make the following distinctions over the prior art of record:

1) Asset verses Network management.(de la Salle)

2) That somehow the NIC address is not viable as a unique identifier based on the prior art teachings.(de la Salle and Barroux)

3) Continuous operation (de la Salle) verses audit based

4) Unique identifier is assumed to exist for each node in the network (Barroux)

5) In summary the Appellant states that neither reference can not use the current and former node identifying values.

Not to overly simplify the Appellant's arguments, but these are not very strong distinctions. As to asset verses network management, the intended use is just that an intended use. There is no functional distinction between the two systems. Asset management is the collection of attributes, configurations and hardware information from a node (computer). Network management provides a system to collect attributes, configurations and hardware information from a node (computer). They serve the same function, to collect information from nodes and store data representing this collected information at a local management repository that may be distributed.

Appellant position that in someway the NIC address is not viable as a unique identifier based on prior art teachings is an interesting approach since the use of the

NIC address is acceptable for Appellant's claimed invention, *id*. The prior art citations and the Appellant's instant invention uses the same **unique identifier**. All use the NIC or MAC address as a reference point for acknowledging the current node is the same as the previous node that sent asset or management data in a prior cycle.

Continuous operation (de la Salle) verses audit based (Appellant) is interesting since network monitoring and management systems, such as those incorporated in de la Salle all allow for systems to go down and reinitialize. These steps allow for an audit to occur where the server and nodes confirm configurations as previously stored in databases such as the MIB in a SNMP environment. They are inherent in the systems, otherwise, they would not function.

Appellant's assertion that a unique identifier is assumed to exist for each node in the network (Barroux) is based on the misunderstanding that Barroux does not explicitly teach the Appellant's instant invention. Specifically, Barroux teaches a number of unique identifiers that Appellant has listed as possible candidates. Both the Appellant and Barroux use NIC addresses and other historical data to identify a node within the network. Further, since the comparison of historical or management information within systems using SNMP includes the use of unique identifiers, it is proffered that the assumption, if any, is based on the inherent functionality of these underlying protocols.

In summary the Appellant states that neither reference can not use the current and former node identifying values. Though this appears to be a strong point the fact is that both pieces of prior art use collection of configuration information from nodes and they both use comparisons with prior data regarding the nodes. This includes identification information or values. de la Salle teaches a network monitoring and management system which collects information about every device within the network and uses data collected with node addresses to identify the specific node and any changes that might occur.

This is fundamental in all network management systems. Barroux expressly teaches a historical asset information data storage scheme for tracking changes within network nodes, to include changes in network cards and node ID. Historical data is collected and compared based on time stamped versions to ascertain what changes have been effected within a node. Lastly, Appellant has attempted to make this distinction around the phrase "node-identifying values" however, this is not recited in claim 1 for example. Every other recitation within the claims is directed to a node identifier that is the NIC address. This is exactly what the node identifier is designated as in at least one embodiment disclosed within de la Salle and Barroux. The fact that the reference teaches the same unique identifier and provides historical data for changes, including the MAC or NIC addresses for the same end does provide

for anticipation of Appellant's claimed invention. They perform the same functions on the same systems.

Examiner has reproduce claims 1 and 13 with a mapping of the claim limitations with the teachings of the prior art. All claims pending in the instant case have been rejected with appropriate mappings to the individual claims with teaching from Barroux and de la Salle.

Claim 1, recites a method for determining a current address value of a network interface card of the node, referred to as a NIC address value (NIC, MAC ID), retrieving form a data storage at the node, a former NIC address value for the node and transmitting asset management information concerning the node together with the current NIC address (MAC address, present configuration). and the former NIC address (MAC address for prior configuration).

Claim 13, recites in a node on a network, a data store comprising a machine readable data structure accessible to a processor in the node and containing node-identification for the client node that includes a current network interface card value for the node, referred to as a NIC address value and a former NIC address value as taught throughout Barroux and de la Salle (Barroux: SNMP Probe, MAC address, ifPhysAddress object, time stats; de la Salle: Board address Object and probe, time stats)

Claims 8, 16, 19, 21, 23 and 24 recite limitations directed to storing the node information and providing a time stamp to the datum relating to the node information and have been effectively covered in the rejection of claims 1-3 and 5-7, *id.* Barroux and de la Salle both include these features expressly and inherently in their relative systems. (SNMP, MAC address, present configuration and MAC address for prior configuration, Barroux: SNMP Probe, MAC address, ifPhysAddress object, time stats ; de la Salle: Board address Object and probe, time stats)

Appellant has argued that the use of various RFCs has been acknowledged, however, that any inference that the cited RFCs anticipate or render obvious the claims at issue is misplaced. (Pages 17-18).

Examiner answers this charge with an observation and provides support for their use. Examiner provided these references to enlighten the Appellant that the protocols described within both de la Salle and Barroux are established and well known as underpinnings in the industry for locating nodes and related configuration (assets, attributes). MPEP 2131.01 provides guidance in these matters of supporting the base teachings with the underlying protocol suites that must be in place to allow functionality. The courts have made this clear when stating: "To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such

evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." *Continental Can Co. USA v. Monsanto Co., 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991)*

Moreover, courts have held that "..as long as there is evidence of record establishing inherency, failure of those skilled in the art to contemporaneously recognize an inherent property, function or ingredient of a prior art reference does not preclude a finding of anticipation". *Atlas Powder Co. v. IRECO, Inc., 190 F.3d 1342, 1349, 51 USPQ2d 1943, 1948 (Fed. Cir. 1999)*

Examiner did not provide a rejection under 35 U.S.C. 103 since this is not a matter of obviousness. The issue at hand is anticipation based on the teachings of either de la Salle or Barroux and the explicit and inherent features of the underlying protocols they call into use and allow all systems to collect management, asset, attribute and configuration information. There is nothing obvious to combine references when that which is taught is well known to be inherent in the systems in such a manner that one or ordinary skill in the art would use them because they are omni present in the networking environment. Quoting from the MPEP: "The express, implicit, and inherent disclosures of a prior art reference may be relied upon in the rejection of claims under 35 U.S.C. 102 or 103. "The inherent teaching of a prior

art reference, a question of fact, arises both in the context of anticipation and obviousness." *In re Napier, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995)* In Napier the Examiner resigned to use the inherent argument support for a rejection under 103. In the instant case both de la Salle and Barroux call into there teachings the use of these omni present resources found as protocol suites within the network. See *In re Schreiber, 128 F.3d 1473, 44 USPQ2d 1429 (Fed. Cir. 1997).* These references were provided to help Appellant understand that the inherent features within the protocol suits called into use within the primary references in fact included the functionality that was afforded them in the rejections. (Paper 8)

The use of underlying protocol suites instilled within the Internet and intranets have been well established. Use of their built-in and inherent features for their intended use is not patentable. Protocols used (as listed, Paper 8 on page 7) in the day to day operations of systems that make them perform these routine functions are **required** to perform the functions. The system would not be able to manage the system without them and therefore their individual presence is inherent in such systems. Appellant is using a "protocol" of method steps that operates in the same manner as the equivalent protocols with a new label. If there is a functional difference that the skilled artisan or one of ordinary skill level in the art would otherwise not be able to perform with these instilled and required protocols then

Appellant should be able to spell out the distinctions that distinguish the independent claims from the prior art of record and the underlying protocols, *id*. For the matter that Barroux may have stated in some fashion that SNMP has been used primarily for monitoring network performance is only a small piece of the big picture and does not detract from the actual purpose of the protocols. As the courts have held "The claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable." *In re Best, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977).*

SNMP stands for "Simple Network Management Protocol" and its purpose is to manage networks to include mapping within the MIB the hardware and software configurations of the system nodes. These provide historical and timely adaptations to the network topology. In the alternate intended use term "asset management" of the underlying network topology. The courts have held that: "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original)* Examiner has met this burden.

Appellant had amended the claims to include limitations directed to the operation of an asset management system with locally stored NIC address transfers for updating the configuration files stored on a host machine. Appellant is teaching the retrieval of stored management or configuration information from a locally stored file that is sent to another node for reporting the old and new configuration data. These operations are built into the protocol suites. SNMP or CMIP agents with files are stored at the client side (Paper 8). The manager node needs to know changes in the clients within the managed network. If a change occurs, either the client agent transmits a packet listing the changes in configuration to the management node containing the MIB or the management node sends a "probe" to detect configuration changes stored in the local client files or by scanning the hardware in a routine fashion. Examiner also provided RFC 1189, directed to CMOT and CMIP which also teaches that the installed protocol suites include the Appellant's claimed invention.

The protocols underlying these operations date back over years prior to Appellant's invention. Appellant's invention is not patentably distinguishable over the prior art of record and the inherent underlying protocols. This is merely using the tools of the trade for their intended use. Further, the courts have held that "A reference anticipates a claim if it discloses the claimed invention such that a skilled artisan could take its teachings in combination with his own knowledge of the

particular art and be in possession of the invention." *In re Graves, 36 USPQ2d 1697 (Fed. Cir. 1995); In re Sase, 207 USPQ 107 (CCPA 1980); In re Samour, 197 USPQ 1 (CCPA 1978).*

In summary, Examiner with the afore facts in hand, can not allow the instant claims on appeal over the well established, express, explicit and inherent teachings of the prior art. Appellant's claims are directed to using the underlying and built in features of a network for their intended use. Further, Barroux and de la Salle teach using these underlying and built in features for managing and obtaining the same information for the same purpose as Appellant has claimed as the novelty of the instant invention.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

William D. Thomson
August 11, 2001

Dr. Hugh Jones
Conferee
Art Unit 2123

Kevin Teska, SPE
Art Unit 2123
Conferee

KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER

B

US PATENT & TRADEMARK OFFICE
PATENT FULL TEXT AND IMAGE DATABASE

Searching 1976-2000...

Results of Search in 1976-2000 db for:
ACLM/"program storage device" AND ACLM/"tangibly embodying": 506 patents.
*Hits **1** through **50** out of **506***

Next 50 Hits

Jump To

Refine Search ACLM/"program storage device" AND ACLM/"tangibly em

	PAT. NO.	Title
1	6,125,208	Writing recognition unit
2	6,122,674	Bi-directional network adapter for interfacing local node of shared memory parallel processing system to multi-stage switching network for communications with remote node
3	6,122,659	Memory controller for controlling memory accesses across networks in distributed shared memory processing systems
4	6,122,631	Dynamic server-managed access control for a distributed file system
5	6,122,628	Multidimensional data clustering and dimension reduction for indexing and searching
6	6,119,247	Remote debugging of internet applications
7	6,119,095	System for planning and revising an itinerary based on intended travel time and expected consumption time
8	6,119,086	Speech coding via speech recognition and synthesis based on pre-enrolled phonetic tokens
9	6,118,897	Interactive drawing recognition processing method and apparatus thereof
10	6,118,892	Method for automatic detection of region of interest for digital x-ray detectors using a filtered histogram
11	6,118,846	Bad pixel column processing in a radiation detection panel
12	6,117,183	Interactive CAD apparatus for designing packaging of logic circuit design
13	6,115,736	System and method for automatically localizing access to remote network components using implicit agent relocation
14	6,115,721	System and method for database save and restore using self-pointers

15 6,113,394 Reading aid

16 6,112,987 Method of executing a transaction on a smartcard, a smartcard and a transaction processing system including a smartcard

17 6,111,984 Method for matching input image with reference image, apparatus for the same, and storage medium storing program for implementing the method

18 6,110,228 Method and apparatus for software maintenance at remote nodes

19 6,108,700 Application end-to-end response time measurement and decomposition

20 6,108,684 Methods and apparatus for balancing loads on a storage subsystem among a plurality of controllers

21 6,108,666 Method and apparatus for pattern discovery in 1-dimensional event streams

22 6,108,425 Method and apparatus for controlling the configuration of a cryptographic processor

23 6,106,561 Simulation gridding method and apparatus including a structured areal gridder adapted for use by a reservoir simulator

24 6,105,122 I/O protocol for highly configurable multi-node processing system

25 6,104,840 Method and system for generating a composite image from partially overlapping adjacent images taken along a plurality of axes

26 6,104,835 Automatic knowledge database generation for classifying objects and systems therefor

27 6,104,810 Pseudorandom number generator with backup and restoration capability

28 6,104,394 Data processing system for automatic storage of objects of an object type within a logical containment system and method therefor

29 6,102,287 Method and apparatus for providing product survey information in an electronic payment system

30 6,101,524 Deterministic replay of multithreaded applications

31 6,101,472 Data processing system and method for navigating a network using a voice command

32 6,101,275 Method for finding a best test for a nominal attribute for generating a binary decision tree

33 6,100,902 Image data approximation considering normal vectors

34 6,100,901 Method and apparatus for cluster exploration and visualization

35 6,098,184 Method for improving mouse performance and virtual device driver therefor

36 6,098,122 Method and apparatus for adaptively blocking outgoing communication requests and adjusting the blocking factor according to the volume of requests being received in an information handling system

37 6,098,115 System for reducing storage access latency with accessing main storage and data bus simultaneously

38 6,097,386 Data processing system having context sensitive visual feedback for user interface controls and method therefor

39 6,097,320 Encoder/decoder system with suppressed error propagation

40 6,094,651 Discovery-driven exploration of OLAP data cubes

41 6,092,083 Database management system which synchronizes an enterprise server and a workgroup user client using a docking agent

42 6,092,065 Method and apparatus for discovery, clustering and classification of patterns in 1-dimensional event streams

43 6,092,038 System and method for providing lossless compression of n-gram language models in

a real-time decoder

44 6,092,025 Hydrocarbon edge detection using seismic amplitude

45 6,088,798 Digital signature method using an elliptic curve, a digital signature system, and a program storage medium having the digital signature method stored therein

46 6,088,705 Method and apparatus for loading data into a database in a multiprocessor environment

47 6,088,032 Computer controlled display system for displaying a three-dimensional document workspace having a means for prefetching linked documents

48 6,088,027 Method and apparatus for screen object manipulation

49 6,088,005 Design and method for a large, virtual workspace

50 6,085,295 Method of maintaining data coherency in a computer system having a plurality of interconnected nodes

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US PATENT & TRADEMARK OFFICE
PATENT FULL TEXT AND IMAGE DATABASE

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Results of Search in 1976-2000 db for:
ACLM/"program storage device" AND ACLM/"tangibly embodying": 506 patents.
*Hits **51** through **100** out of **506***

	PAT. NO.	Title
51	6,085,258	State machine for selectively performing an operation on a single or a plurality of registers depending upon the register address specified in a packet
52	6,085,223	Method and apparatus for providing database information to non-requesting clients
53	6,085,217	Method and apparatus for controlling the assignment of units of work to a workload enclave in a client/server system
54	6,085,197	Object graph editing context and methods of use
55	6,084,582	Method and apparatus for recording a voice narration to accompany a slide show
56	6,084,553	Design and method for a large, virtual workspace
57	6,083,271	Method and apparatus for specifying multiple power domains in electronic circuit designs
58	6,081,812	Identifying at-risk components in systems with redundant components
59	6,081,624	Spatial index compression through spatial subdivision encoding
60	6,081,397	Method and apparatus for SID-to-SID period estimation
61	6,081,262	Method and apparatus for generating multi-media presentations
62	6,080,201	Integrated placement and synthesis for timing closure of microprocessors
63	6,078,990	Volume set configuration using a single operational view
64	6,078,925	Computer program product for database relational extenders
65	6,078,400	Printing system having function of displaying error information and method of displaying error information

66 6,076,110 System and method for server virtual device name negotiation
67 6,076,106 User interface for displaying information about a computer network
68 6,076,043 Utilization effectiveness of nutrients in a population
69 6,073,218 Methods and apparatus for coordinating shared multiple raid controller access to common storage devices
70 6,073,157 Program execution in a software run-time environment
71 6,073,146 System and method for processing chinese language text
72 6,073,096 Speaker adaptation system and method based on class-specific pre-clustering training speakers
73 6,073,095 Fast vocabulary independent method and apparatus for spotting words in speech
74 6,073,091 Apparatus and method for forming a filtered inflected language model for automatic speech recognition
75 6,070,245 Application interface method and system for encryption control
76 6,070,235 Data processing system and method for capturing history buffer data
77 6,070,190 Client-based application availability and response monitoring and reporting for distributed computing environments
78 6,070,073 Communication system and method for notification and call routing in a mobile satellite network
79 6,069,630 Data processing system and method for creating a link map
80 6,067,513 Speech recognition method and speech recognition apparatus
81 6,065,088 System and method for interrupt command queuing and ordering
82 6,065,058 Dynamic push filtering based on information exchanged among nodes in a proxy hierarchy
83 6,065,019 Method and apparatus for allocating and freeing storage utilizing multiple tiers of storage organization
84 6,064,799 Method and apparatus for controlling the radial temperature gradient of a wafer while ramping the wafer temperature
85 6,064,762 System and method for separating foreground information from background information on a document
86 6,063,133 No preprocessor for embedded SQL in a 3GL
87 6,061,741 Method and apparatus for synchronization of connectionless applications across a network by using simple encryption tokens
88 6,061,703 Pseudorandom number generator with normal and test modes of operation
89 6,061,669 Notification system for access to and printing of proprietary network services
90 6,061,606 Geometric phase analysis for mask alignment
91 6,059,842 System and method for optimizing computer software and hardware
92 6,058,416 Flexible state sharing and consistency mechanism for interactive applications
93 6,058,301 Cellular fraud prevention using selective roaming
94 6,058,188 Method and apparatus for interoperable validation of key recovery information in a cryptographic system
95 RE36,683 Apparatus and method for audio data compression and expansion with reduced block floating overhead
96 6,055,562 Dynamic mobile agents

97 6,055,558 Pacing of multiple producers when information is required in natural order

98 6,055,539 Method to reduce I/O for hierarchical data partitioning methods

99 6,055,433 Data processing system and method for balancing a load in a communications network

100 6,055,418 Computer program product configured to control modular transmission system components

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	PAT. NO.	Title
101	6,054,985	Data processing system and method for simulating compound objects
102	6,052,680	Method and apparatus for determining whether to route an input to a process based on a relevance between the input and the process
103	6,052,476	Method and apparatus for controlling x-ray angiographic image acquistion
104	6,052,469	Interoperable cryptographic key recovery system with verification by comparison
105	6,049,767	Method for estimation of feature gain and training starting point for maximum entropy/minimum divergence probability models
106	6,047,130	Apparatus and method for portrait photography
107	RE36,647	System for transmitting and receiving digital information through parallel printer port of computer by using embedding strobe bit in eight bit data of printer port
108	6,044,388	Pseudorandom number generator
109	6,041,419	Programmable delay timing calibrator for high speed data interface
110	6,041,133	Method and apparatus for fingerprint matching using transformation parameter clustering based on local feature correspondences
111	6,040,586	Method and system for velocity-normalized position-based scanning
112	6,038,574	Method and apparatus for clustering a collection of linked documents using co-citation analysis
113	6,038,526	Method for detecting weak signals in a non-gaussian and non-stationary background
114	6,038,517	Computer system and method for dynamically assessing the market readiness of a

product under development

115 6,038,225 Communication system capable of switching between frames of differing configuration during communication, and a control method for the same

116 6,035,271 Statistical methods and apparatus for pitch extraction in speech recognition, synthesis and regeneration

117 6,035,110 Identifying candidate nodes for phase assignment in a logic network

118 6,035,072 Mapping defects or dirt dynamically affecting an image acquisition device

119 6,034,689 Web browser allowing navigation between hypertext objects using remote control

120 6,032,198 Application design supporting method and apparatus for client/server system

121 6,031,541 Method and apparatus for viewing panoramic three dimensional scenes

122 6,026,413 Determining how changes to underlying data affect cached objects

123 6,026,340 Automotive occupant sensor system and method of operation by sensor fusion

124 6,026,224 Redundant vias

125 6,025,842 System and method for window queues and white space activation for toggling windows

126 6,025,839 Method for displaying information in a virtual reality environment

127 6,024,572 Means for adding educational enhancements to computer games

128 6,023,712 Method and apparatus for brokering memory resources

129 6,023,698 System and method for transparently registering and updating information over the internet

130 6,023,567 Method and apparatus for verifying timing rules for an integrated circuit design

131 6,021,442 Method and apparatus for partitioning an interconnection medium in a partitioned multiprocessor computer system

132 6,018,621 Identifying an optimizable logic region in a logic network

133 6,018,498 Automated seismic fault detection and picking

134 6,018,346 Freeform graphics system having meeting objects for supporting meeting objectives

135 6,016,491 Generic file format for multiple security requirements

136 6,016,287 Apparatus and method for accurately determining the location of events such as peaks in seismic data

137 6,016,143 Multi-device direct I/O object that generates transactions capable of controlling multiple instruments and transaction dialog boxes having device and address fields

138 6,015,949 System and method for applying a harmonic change to a representation of musical pitches while maintaining conformity to a harmonic rule-base

139 6,015,667 Multicomponent analysis method including the determination of a statistical confidence interval

140 6,014,692 Web browser file system attachment

141 6,014,510 Method for performing timing analysis of a clock circuit

142 6,014,508 Method of adding constrained cluster points to interconnection nets in integrated circuit chips and packages

143 6,014,117 Ambient vision display apparatus and method

144 6,012,126 System and method for caching objects of non-uniform size using multiple LRU stacks partitions into a range of sizes

145 6,012,084 Virtual network communication services utilizing internode message delivery task

mechanisms

146 6,011,559 Layout method for arc-dominated labelled graphs

147 6,011,211 System and method for approximate shifting of musical pitches while maintaining harmonic function in a given context

148 6,006,196 Method of estimating future replenishment requirements and inventory levels in physical distribution networks

149 6,005,597 Method and apparatus for program selection

150 6,003,620 Downhole in-situ measurement of physical and or chemical properties including fluid saturations of cores while coring

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	PAT. NO.	Title
151	6,003,095	Apparatus and method for demand loading a dynamic link library
152	6,003,048	System and method for converting a coordinate based document to a markup language (ML) based document
153	6,003,029	Automatic subspace clustering of high dimensional data for data mining applications
154	6,001,013	Video dance game apparatus and program storage device readable by the apparatus
155	6,000,033	Password control via the web
156	5,999,488	Method and apparatus for migration by finite differences
157	5,999,255	Method and apparatus for measuring Raman spectra and physical properties in-situ
158	5,996,090	Method and apparatus for quantitative diagnosis of performance problems using external representations
159	5,996,056	Apparatus for reducing a computational result to the range boundaries of a signed 8-bit integer in case of overflow
160	5,995,938	Medication compliance system
161	5,995,931	Method for modeling and recognizing speech including word liaisons
162	RE36,422	Debugging system wherein multiple code views are simultaneously managed
163	5,991,787	Reducing peak spectral error in inverse Fast Fourier Transform using MMX.TM. technology
164	5,991,688	Route setting method and apparatus in navigation system, and program storage device readable by the apparatus

165 5,987,240 Design rules checker for an integrated circuit design

166 5,987,124 Method and apparatus for encrypting long blocks using a short-block encryption procedure

167 5,984,023 Downhole in-situ measurement of physical and or chemical properties including fluid saturations of cores while coring

168 5,983,341 Data processing system and method for extending the time for execution of an instruction

169 5,983,020 Rule-based engine for transformation of class hierarchy of an object-oriented program

170 5,981,957 Signal generation and mixing electronics for frequency-domain lifetime and spectral fluorometry

171 5,978,936 Run time error probe in a network computing environment

172 5,978,792 Method and apparatus for generating dynamic and hybrid sparse indices for workfiles used in SQL queries

173 5,978,580 Passing arrays to stored procedures

174 5,978,576 Computer performance modeling system and method

175 5,978,425 Hybrid phase-locked loop employing analog and digital loop filters

176 5,978,384 Introducing inter-packet gaps in network transmissions

177 5,977,890 Method and apparatus for data compression utilizing efficient pattern discovery

178 5,974,462 Method and apparatus for controlling the number of servers in a client/server system

179 5,974,194 Projection based method for scratch and wire removal from digital images

180 5,970,494 Computer program product and program storage device for a data transmission dictionary for encoding, storing, and retrieving hierarchical data processing information for a computer system

181 5,970,250 System, method, and computer program product for scoping operating system semanticis in a computing environment supporting multi-enclave processes

182 5,970,245 Method for debugging shared procedures contained in dynamic link library files

183 5,970,239 Apparatus and method for performing model estimation utilizing a discriminant measure

184 5,969,720 Data processing system and method for implementing an informative container for a file system

185 5,966,135 Vector-based geographic data

186 5,963,953 Method, and system for product configuration

187 5,963,950 Method and system for facilitating access to selectable elements on a graphical user interface

188 5,961,601 Preserving state information in a continuing conversation between a client and server networked via a stateless protocol

189 5,960,421 Service interface repository internationalization

190 5,960,181 Computer performance modeling system and method

191 5,960,169 Transformational raid for hierarchical storage management system

192 5,959,300 Attenuation correction in a medical imaging system using computed path lengths and attenuation values of a model attenuation medium

193 5,956,728 Object graph editing context and methods of use

194 5,956,712 Byte range locking in a distributed environment

195 5,956,708 Integration of link generation, cross-author user navigation, and reuse identification in authoring process

196 5,955,737 Chemometric analysis for extraction of individual fluorescence spectrum and lifetimes from a target mixture

197 5,953,532 Installation and deinstallation of application programs

198 5,953,420 Method and apparatus for establishing an authenticated shared secret value between a pair of users

199 5,953,051 Method and apparatus for controlling access in a video distribution network

200 5,951,394 Controller to maintain a certain set of environmental parameters in an environment

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	PAT. NO.	Title
201	5,950,211	Discarded history method for solving streams message block leakages
202	5,950,184	Indexing a database by finite-state transducer
203	5,949,375	Method of and apparatus for calculating position of movable body in navigation system, method of and apparatus for correcting the position, and program storage device readable by the apparatus
204	5,946,486	Apparatus and method for tracing entries to or exits from a dynamic link library
205	5,946,475	Method for performing transistor-level static timing analysis of a logic circuit
206	5,946,465	Method and system for recovering system resources used by an inactive Telnet client
207	5,944,839	System and method for automatically maintaining a computer system
208	RE36,286	Preemptive demount in an automated storage library
209	5,940,877	Cache address generation with and without carry-in
210	5,940,840	Phantom files for dynamic read bandwidth measurements of computer disks
211	5,940,825	Adaptive similarity searching in sequence databases
212	5,940,616	Tracker class for object-oriented programming environments
213	5,940,593	Simulating a multi-tiered computer environment on a single development system for debugging
214	5,937,066	Two-phase cryptographic key recovery system
215	5,936,624	Data processing system having a logical containment system and method therefor
216	5,936,181	System and method for applying a role-and register-preserving harmonic

transformation to musical pitches

217 5,933,824 Methods and apparatus for locking files within a clustered storage environment

218 5,933,601 Method for systems management of object-based computer networks

219 5,931,912 Traversal path-based approach to understanding user-oriented hypertext object usage

220 5,930,811 Document processing apparatus

221 5,930,793 Performance optimization in a heterogeneous, distributed database environment

222 5,930,786 Method and apparatus for providing shared data to a requesting client

223 5,930,512 Method and apparatus for building and running workflow process models using a hypertext markup language

224 5,926,637 Service interface repository code generation data

225 5,926,089 Electric power system protection and control system and distributed control system

226 5,924,092 Computer system and method which sort array elements to optimize array modifications

227 5,923,890 Method and apparatus for optimizing the handling of synchronous requests to a coupling facility in a sysplex configuration

228 5,923,334 Polyhedral environment map utilizing a triangular data structure

229 5,923,018 Medical care schedule and record aiding system, medical care schedule and record aiding method, and program storage device readable by the system

230 5,920,717 Method and apparatus for automated program-generation

231 5,918,006 Communication device provided with a storage medium for storing a control program

232 5,917,998 Method and apparatus for establishing and maintaining the status of membership sets used in mirrored read and write input/output without logging

233 5,917,723 Method and apparatus for transferring data between two devices with reduced microprocessor overhead

234 5,917,499 Interactive graph display system

235 5,917,478 Memory allocation method and apparatus for compression and decoding picture data

236 5,916,307 Method and structure for balanced queue communication between nodes in a distributed computing application

237 5,913,197 Medical care schedule and record aiding system and method

238 5,912,831 Process and system for adding or substracting symbols in any base without converting to a common base

239 5,912,670 Method and apparatus for overlaying a bit map image on an environment map

240 5,912,669 Screen navigation method

241 5,910,796 Monitor gamma determination and correction

242 5,909,593 System for assigning snoop levels to snooper modules and selectively invoking snooper modules having specified relation to a selected snoop level for hardware detection

243 5,908,470 Method for contention-free access and management of timers in multiprocessing environments

244 5,907,618 Method and apparatus for verifiably providing key recovery information in a cryptographic system

245 5,905,982 Handling null values in SQL queries over object-oriented data

246 5,905,889 Resource management system using next available integer from an integer pool and

returning the integer thereto as the next available integer upon completion of use

247 5,903,467 Selecting phase assignments for candidate nodes in a logic network

248 5,901,288 Network operating information system having design device and automatic setting device

249 5,899,992 Scalable set oriented classifier

250 5,899,855 Modular microprocessor-based health monitoring system

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	PAT. NO.	Title
251	5,897,618	Data processing system and method for switching between programs having a same title using a voice command
252	5,895,491	Apparatus and method for writing an item to a line in a memory table shared by multiple processors
253	5,894,516	Broadcast software distribution
254	5,893,916	Method of converting man pages to help topic files
255	5,893,911	Method for defining and applying rules for message distribution for transaction processing in a distributed application
256	5,893,905	Automated SLA performance analysis monitor with impact alerts on downstream jobs
257	5,893,108	System, method, and computer program product for efficiently translating relational tuples to object-oriented objects
258	5,893,063	Data processing system and method for dynamically accessing an application using a voice command
259	5,892,853	Methods, apparatus and program storage device for removing scratch or wire noise, and recording media therefor
260	5,892,506	Multitrack architecture for computer-based editing of multimedia sequences
261	5,890,158	Method, apparatus, and program storage device for sharing objects with a network server and a database server using a common object model
262	5,890,148	System and method for generating uniqueness information for optimizing an SQL

query

263 5,889,764 Low-latency multi-party audio chat

264 5,887,184 Method and apparatus for partitioning an interconnection medium in a partitioned multiprocessor computer system

265 5,886,694 Method for automatically laying out controls in a dialog window

266 5,884,685 Quality prediction and quality control of continuous-cast steel

267 5,884,324 Agent for replicating data based on a client defined replication period

268 5,884,318 Method and system for facilitating access to selectable elements on a graphical user interface

269 5,884,284 Telecommunication user account management system and method

270 5,883,818 Method for generating an improved model for evaluating the operation of an integrated circuit design

271 5,881,268 Comparative performance modeling for distributed object oriented applications

272 5,881,238 System for assignment of work requests by identifying servers in a multisystem complex having a minimum predefined capacity utilization at lowest importance level

273 5,881,232 Generic SQL query agent

274 5,881,219 Random reliability engine for testing distributed environments

275 5,878,424 Method and apparatus for indexing patterned sparse arrays for microprocessor data cache

276 5,875,431 Legal strategic analysis planning and evaluation control system and method

277 5,875,337 Modifier for a program executing parallel processes that reduces wait time for access to a shared resource

278 5,873,052 Alignment-based similarity scoring methods for quantifying the differences between related biopolymer sequences

279 5,873,051 Method and apparatus for processing at least two seismic data sets during a step to derive a third data set

280 5,872,848 Method and apparatus for witnessed authentication of electronic documents

281 5,872,672 System and method for monitoring and analyzing tape servo performance

282 5,870,470 Method and apparatus for encrypting long blocks using a short-block encryption procedure

283 5,867,736 Methods for simplified integration of host based storage array control functions using read and write operations on a storage array control port

284 5,864,843 Method and apparatus for extending a database management system to operate with diverse object servers

285 5,864,842 Optimization of SQL queries using hash star join operations

286 5,864,700 Sequencing and error detection of template instantiations during compilation of C++ Programs

287 5,864,655 Managing removable media in raid and rail environments

288 5,862,378 Passing arrays to stored procedures

289 5,860,929 Fractional moving blood volume estimation with power doppler ultrasound

290 5,850,619 Frozen precipitation accumlation alert system

291 5,850,550 No preprocessor and a source level debugger for embedded SQL in a 3GL

292 5,850,549 Global variable coalescing

293 5,850,544 System and method for efficient relational query generation and tuple-to-object translation in an object-relational gateway supporting class inheritance

294 5,847,706 Sizeable window for tabular and graphical representation of data

295 5,847,691 Microkeyer for microcomputer broadcast video overlay of a DC restored external video signal with a computer's DC restored video signal

296 5,845,274 Computer program product for avoiding complete index tree traversals in sequential and almost sequential index probes

297 5,845,121 Expression evaluation in a multi-language debugger

298 5,845,068 Multilevel security port methods, apparatuses, and computer program products

299 5,842,209 User interface for visually depicting inner/outer/left/right joins in a database system

300 5,842,208 High performance recover/build index system by unloading database files in parallel

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	PAT. NO.	Title
301	5,841,678	Modeling and simulation of a reaction for hydrotreating hydrocarbon oil
302	5,838,958	Automatic track following sync timing
303	5,835,883	Method for determining distribution of reservoir permeability, porosity and pseudo relative permeability
304	5,835,882	Method for determining barriers to reservoir flow
305	5,835,770	User inquiry facility for task status in a distributed system
306	5,835,638	Method and apparatus for comparing symbols extracted from binary images of text using topology preserved dilated representations of the symbols
307	5,835,091	Manipulating and displaying a plurality of views in a graphical user interface
308	5,832,477	Method and apparatus for reordering complex SQL queries containing inner and outer join operations
309	5,826,257	Method and structure for maintaining and utilizing a lookup value associated with a stored database value
310	5,826,016	Pass-word managing system and pass-word managing method
311	5,819,276	Method for supporting multiple file-systems in file input/output operations
312	5,819,116	System for transmitting and receiving combination of compressed audio information and embedded strobe bit between computer and external device through parallel printer port of computer
313	5,818,458	Graphic-shaping method and apparatus for producing axissymmetrical graphic with

respect to valid symmetry axes

314 5,815,573 Cryptographic key recovery system

315 5,813,011 Storage of a compressed file containing its own compression management table

316 5,812,430 Componentized digital signal processing

317 5,812,135 Reorganization of nodes in a partial view of hierarchical information

318 5,809,302 System and method for enabling pointers to be passed from computer programs written using computer programming languages that do not support pointers

319 5,809,211 Ramping susceptor-wafer temperature using a single temperature input

320 5,806,060 Interactive data analysis employing a knowledge base

321 5,805,891 System and method for managing maintenance of computer software

322 5,805,863 Memory pattern analysis tool for use in optimizing computer program code

323 5,805,849 Data processing system and method for using an unique identifier to maintain an age relationship between executing instructions

324 5,805,457 System for analyzing sound quality in automobiles using musical intervals

325 5,802,492 Computer aided routing and positioning system

326 5,802,354 Method and apparatus for synchronizing selected logical partitions of a partitioned information handling system to a test datesource

327 5,802,344 Method and apparatus for dynamic segment allocation in log structured arrays

328 5,801,693 "Clear" extension to a paste command for a clipboard function in a computer system

329 5,799,309 Generating an optimized set of relational queries fetching data in an object-relational database

330 5,799,297 Task workflow management system and method including an external program execution feature

331 5,798,950 Method and apparatus for estimating durations of activities in forming a current system, based on past durations of activities in forming past systems

332 5,798,769 Method and apparatus for maintaining links between graphic objects in a free-form graphics display system

333 5,797,012 Connectivity based program partitioning

334 5,797,000 Method of performing a parallel relational database query in a multiprocessor environment

335 5,796,951 System for displaying information relating to a computer network including association devices with tasks performable on those devices

336 5,796,830 Interoperable cryptographic key recovery system

337 5,796,400 Volume-based free form deformation weighting

338 5,794,250 Method and apparatus for extending existing database management system for new data types

339 5,793,885 Computationally efficient low-artifact system for spatially filtering digital color images

340 5,793,495 Method for avoiding creation of duplicate keyword objects representing user entered data on a machine readable form

341 5,793,377 Method and apparatus for polar coordinate snap in a computer implemented drawing tool

342 5,790,867 Compiler with extended redundant copy elimination

343 5,787,418 Find assistant for creating database queries
344 5,787,411 Method and apparatus for database filter generation by display selection
345 5,787,287 Representation of control flow and data dependence for machine
346 5,787,284 Improving memory layout based on connectivity considerations
347 5,787,283 Framework for manufacturing logistics decision support
348 5,787,005 Method and apparatus for signal threshold adjustment that compensates for signal asymmetry
349 5,787,001 Method for using sorting techniques in a type-safe way
350 5,786,907 High speed color compensation system

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	PAT. NO.	Title
351	5,786,826	Method and apparatus for parallel rasterization
352	5,784,612	Configuration and unconfiguration of distributed computing environment components
353	5,784,294	System and method for comparative molecular moment analysis (CoMMA)
354	5,781,906	System and method for construction of a data structure for indexing multidimensional objects
355	5,781,546	Route restrictions for deadlock free routing with increased bandwidth in a multi-stage cross point packet switch
356	5,778,375	Database normalizing system
357	5,778,353	Computer program product for optimizing data retrieval using index scanning
358	5,778,092	Method and apparatus for compressing color or gray scale documents
359	5,775,993	Roulette gaming machine
360	5,774,716	Computer program product to enable multiple computer systems to share single sequential log
361	5,774,552	Method and apparatus for retrieving X.509 certificates from an X.500 directory
362	5,771,129	Method and apparatus for detecting and matching the recorded speed of previously recorded tape
363	5,768,606	Method, system, computer program product and program storage device for declaring column widths of matrices

364 5,768,603 Method and system for natural language translation

365 5,768,577 Performance optimization in a heterogeneous, distributed database environment

366 5,768,390 Cryptographic system with masking

367 5,764,913 Computer network status monitoring system

368 5,764,889 Method and apparatus for creating a security environment for a user task in a client/server system

369 5,761,660 Computer program product and program storage device for database access using a shared electronic store in a multi-system environment having shared disks

370 5,761,657 Global optimization of correlated subqueries and exists predicates

371 5,761,652 Constructing balanced multidimensional range-based bitmap indices

372 5,761,515 Branch on cache hit/miss for compiler-assisted miss delay tolerance

373 5,761,078 Field programmable gate arrays using semi-hard multicell macros

374 5,760,716 Vector data compression

375 5,758,339 Method of identifying shared and unshared information using system chapters, a sysplex chapter, a table of contents, and a header

376 5,758,147 Efficient information collection method for parallel data mining

377 5,758,145 Method and apparatus for generating dynamic and hybrid sparse indices for workfiles used in SQL queries

378 5,754,841 Method and apparatus for parallel execution of user-defined functions in an object-relational database management system

379 5,754,760 Automatic software testing tool

380 5,752,017 Method and apparatus for executing complex SQL queries using projection operations

381 5,751,992 Computer program product for continuous destaging of changed data from a shared cache in a multisystem shared disk environment wherein castout interest is established in a hierarchical fashion

382 5,751,962 Object-based systems management of computer networks

383 5,748,929 Program storage device and computer program product for interactively managing a distributed database system

384 5,748,884 Autonotification system for notifying recipients of detected events in a network environment

385 5,748,809 Active area identification on a machine readable form using form landmarks

386 5,748,491 Deconvolution method for the analysis of data resulting from analytical separation processes

387 5,745,768 Computer program product and program storage device for supporting native and non-native signals transferred between processing entities of a computer program

388 5,745,692 Automated systems administration of remote computer servers

389 5,745,685 Protocol extension in NSPP using an acknowledgment bit

390 5,742,810 System, method and computer program product for passing host variables to a database management system

391 5,742,670 Passive telephone monitor to control collaborative systems

392 5,737,611 Methods for dynamically escalating locks on a shared resource

393 5,737,593 System and method for defining shapes with which to mine time sequences in

computerized databases

394 5,737,591 Database view generation system

395 5,737,580 Wiring design tool improvement for avoiding electromigration by determining optimal wire widths

396 5,737,520 Method and apparatus for correlating logic analyzer state capture data with associated application data structures

397 5,737,424 Method and system for secure distribution of protected data using elliptic curve systems

398 5,734,811 Segment substitution/swap for network restoration pre-plans

399 5,734,582 Method and system for layout and schematic generation for heterogeneous arrays

400 5,731,985 Chip sizing for hierarchical designs

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	PAT. NO.	Title
401	5,729,228	Parallel compression and decompression using a cooperative dictionary
402	5,727,199	Database mining using multi-predicate classifiers
403	5,724,568	Reordering complex SQL queries containing inner and outer join operations using hypergraphs and required sets
404	5,724,564	Computer program product and program storage device for representing and signaling run-time program conditions
405	5,721,915	Interaction between application of a log and maintenance of a table that maps record identifiers during online reorganization of a database
406	5,717,865	Method for assisting individuals in decision making processes
407	5,717,835	Simple approach to case-based reasoning for data navigation tasks
408	5,715,400	System and method for providing merchant information and establishing links to merchants while presenting a movie
409	5,713,015	Reordering of complex SQL queries involving GROUPBYs, joins, outer joins and full outer joins
410	5,712,986	Asynchronous PCI-to-PCI Bridge
411	5,710,578	Computer program product for utilizing fast polygon fill routines in a graphics display system
412	5,708,759	Speech recognition using phoneme waveform parameters
413	5,706,512	Computer program product for queuing and retrieving data objects to and from a

shared storage medium

414 5,706,499 Functional compensation in a heterogeneous, distributed database environment

415 5,706,437 System and method for accessing a service on a services network

416 5,706,349 Authenticating remote users in a distributed environment

417 5,706,194 Non-unique seismic lithologic inversion for subterranean modeling

418 5,701,460 Intelligent joining system for a relational database

419 5,701,456 System and method for interactively formulating database queries using graphical representations

420 5,701,455 Method and apparatus for reordering complex SQL queries using a modified generalized outer join operator

421 5,701,454 Simplification of SQL queries using generalized inference propagation and generalized transitive closure

422 5,696,960 Computer program product for enabling a computer to generate uniqueness information for optimizing an SQL query

423 5,696,713 Method for faster division by known divisor while maintaining desired accuracy

424 5,694,342 Method for detecting signals in non-Gaussian background clutter

425 5,692,182 Bufferpool coherency for identifying and retrieving versions of workfile data using a producing DBMS and a consuming DBMS

426 5,692,174 Query parallelism in a shared data DBMS system

427 5,692,156 Computer program product for overflow queue processing

428 5,692,129 Managing application programs in a computer network by using a database of application objects

429 5,689,698 Method and apparatus for managing shared data using a data surrogate and obtaining cost parameters from a data dictionary by evaluating a parse tree object

430 5,689,633 Computer program product and program storage device for including stored procedure user defined function or trigger processing within a unit of work

431 5,687,362 Enumerating projections in SQL queries containing outer and full outer joins in the presence of inner joins

432 5,680,603 Method and apparatus for reordering complex SQL queries containing inner and outer join operations

433 5,680,602 Trigger generation in an active database management system

434 5,675,804 System and method for enabling a compiled computer program to invoke an interpretive computer program

435 5,673,319 Block cipher mode of operation for secure, length-preserving encryption

436 5,668,988 Method for mining path traversal patterns in a web environment by converting an original log sequence into a set of traversal sub-sequences

437 5,668,718 Generating growth alternatives

438 5,666,435 System for analysis of x-ray films of nucleotide sequences

439 5,664,183 Application of groupware to ISO 9000 registration via facilitated work sessions

440 5,664,174 System and method for discovering similar time sequences in databases

441 5,663,890 Method, apparatus and computer program product for determining a frequency domain response of a nonlinear microelectronic circuit

442 5,661,807 Authentication system using one-time passwords

443 5,659,727 Computer program product and program storage device for encoding, storing, and retrieving hierarchical data processing information for a computer system

444 5,659,492 Chemical mechanical polishing endpoint process control

445 5,657,447 Platform-transparent registration and build of stored procedures and user-defined functions

446 5,655,107 Digital logic wire delay simulation

447 5,652,917 System for transmitting and receiving combination of compressed digital information and embedded strobe bit between computer and external device through parallel printer port of computer

448 5,652,899 Software understanding aid for generating and displaying simiplified code flow paths with respect to target code statements

449 5,652,829 Feature merit generator

450 5,651,069 Software-efficient message authentication

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	PAT. NO.	Title
451	5,648,648	Personal identification system for use with fingerprint data in secured transactions
452	5,646,956	System and method for estimating top contributors
453	5,646,509	Battery capacity test and electronic system utilizing same
454	5,644,751	Distributed file system (DFS) cache management based on file access characteristics
455	5,640,561	Computerized method and system for replicating a database using log records
456	5,640,559	System and method of encoding units of data including entity/relationship data, function calls and file data using a common format (CDF) according to formal CDF grammar rules
457	5,640,500	Computer program product for enabling a computer to construct displays of partially ordered data
458	5,640,487	Building scalable n-gram language models using maximum likelihood maximum entropy n-gram models
459	5,640,014	Laser diode spectrometer for analyzing the ratio of isotopic species in a substance
460	5,636,291	Continuous parameter hidden Markov model approach to automatic handwriting recognition
461	5,636,144	Evaluation and ranking of manufacturing line non-numeric information
462	5,635,931	System and method for compressing data information
463	5,634,002	Method and system for testing graphical user interface programs
464	5,633,734	Method and apparatus for modifying a fluorescent portion of a digital image

465 5,632,015 Computer program product to efficiently process diverse result sets returned by a stored procedure

466 5,629,695 Order preserving run length encoding with compression codeword extraction for comparisons

467 5,628,006 Computer program product and program storage device for merging and separating attributes of consoles

468 5,623,676 Computer program product and program storage device for safing asynchronous interrupts

469 5,621,809 Computer program product for automatic recognition of a consistent message using multiple complimentary sources of information

470 5,621,665 Selecting levels for factors for industrial process experiments

471 5,615,373 Data lock management in a distributed file server system determines variable lock lifetime in response to request to access data object

472 5,615,361 Exploitation of uniqueness properties using a 1-tuple condition for the optimization of SQL queries

473 5,615,341 System and method for mining generalized association rules in databases

474 5,615,284 Stylus-input recognition correction manager computer program product

475 5,615,213 Message transmission using out-of-band signaling channel

476 5,612,700 System for extracting targets from radar signatures

477 5,606,700 Computer program product and program storage device for object oriented programming platform

478 5,600,832 Variant domains and variant maps in a versioned database management system

479 5,590,324 Optimization of SQL queries using universal quantifiers, set intersection, and max/min aggregation in the presence of nullable columns

480 5,590,322 Method and apparatus for the modeling and query of database structures using natural language-like constructs

481 5,590,321 Push down optimization in a distributed, multi-database system

482 5,588,110 Method for transferring data between two devices that insures data recovery in the event of a fault

483 5,581,795 System for transmitting and receiving digital information through parallel printer port of computer by using embedding strobe bit in eight bit data of printer port

484 5,581,758 Computer program product for object specification, generation, and management in a distributed database

485 5,564,113 Computer program product for rendering relational database management system differences transparent

486 5,564,050 System and method for enabling an interpreted programming language to be executed in a database management system environment

487 5,564,047 Trigger generation in an active database management system

488 5,564,019 Program storage device and computer program product for managing a shared direct access storage device with a fixed block architecture

489 5,561,803 Computer program product and program storage device for incremental processing of computer objects

490 5,561,798 Computer program product and program storage device for improving data recovery performance

491 5,559,949 Computer program product and program storage device for linking and presenting movies with their underlying source information

492 5,559,707 Computer aided routing system

493 5,551,031 Program storage device and computer program product for outer join operations using responsibility regions assigned to inner tables in a relational database

494 5,548,758 Optimization of SQL queries using early-out join transformations of column-bound relational tables

495 5,548,755 System for optimizing correlated SQL queries in a relational database using magic decorrelation

496 5,548,754 Optimization of SQL queries using early-out join transformations

497 5,546,570 Evaluation strategy for execution of SQL queries involving recursion and table queues

498 5,543,621 Laser diode spectrometer for analyzing the ratio of isotopic species in a substance

499 5,542,071 System for determining communication speed of parallel printer port of computer by using start timer and stop timer commands within data combined with embedded strobe

500 5,535,131 System for analyzing sound quality in automobile using musical intervals

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	PAT. NO.	Title
501	5,528,260	Method and apparatus for proportional auto-scrolling
502	5,513,214	System and method of estimating equalizer performance in the presence of channel mismatch
503	5,437,023	Noise-tolerant address transmission system for digital telecommunication network
504	5,307,262	Patient data quality review method and system
505	5,179,579	Radiograph display system with anatomical icon for selecting digitized stored images
506	5,005,137	Method for optimizing data streams containing two-byte characters

US005860929A

United States Patent [19]

Rubin et al.

[11] Patent Number: 5,860,929

[45] Date of Patent: Jan. 19, 1999

[54] **FRACTIONAL MOVING BLOOD VOLUME ESTIMATION WITH POWER DOPPLER ULTRASOUND**

[75] Inventors: **Jonathan M. Rubin; Ronald S. Adler; J. Brian Fowlkes**, all of Ann Arbor, Mich.; **Ray Steven Spratt**, San Jose, Calif.

[73] Assignee: **The Regents of the University of Michigan**, Ann Arbor, Mich.

[21] Appl. No.: **657,897**

[22] Filed: **Jun. 7, 1996**

[51] **Int. Cl.**[6] **A61B 8/06**

[52] **U.S. Cl.** **600/454**

[58] **Field of Search** 128/661.07–661.1, 128/916; 73/861.25; 600/454–458

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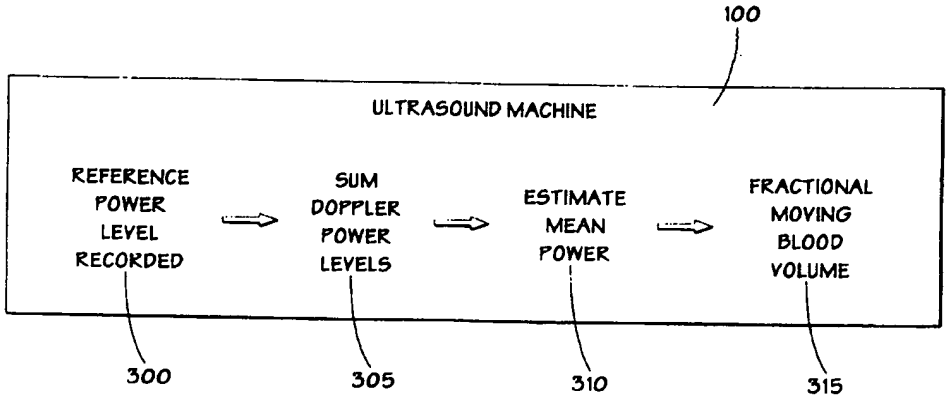
(List continued on next page.)

Primary Examiner—Francis Jaworski
Attorney, Agent, or Firm—Arnold, White & Durkee

[57] **ABSTRACT**

A method for quantitatively estimating the amount of tissue that contains moving blood using power Doppler ultrasound. A region of interest is identified from a frozen image (i.e., a snapshot screen display created by displaying the last real-time image for a given scan). The region of interest is specified by using a pointing device (e.g., a mouse). An object that contains one hundred percent blood flow and is located at the same depth as the region of interest, but not necessarily inside the region of interest, is identified and the corresponding power noted and designated as the reference power level. The display is adjusted to show the one hundred percent blood flow vessel in a designated color (such as, for example, green) and all other power levels are normalized to the reference power level. The fractional blood volume is quantitatively estimated by summing the normalized Doppler power levels in a region of interest and dividing the sum by the number of pixels in region of interest. The numerical result for the specified region of interest may be shown on the display of the ultrasound scanner.

20 Claims, 3 Drawing Sheets



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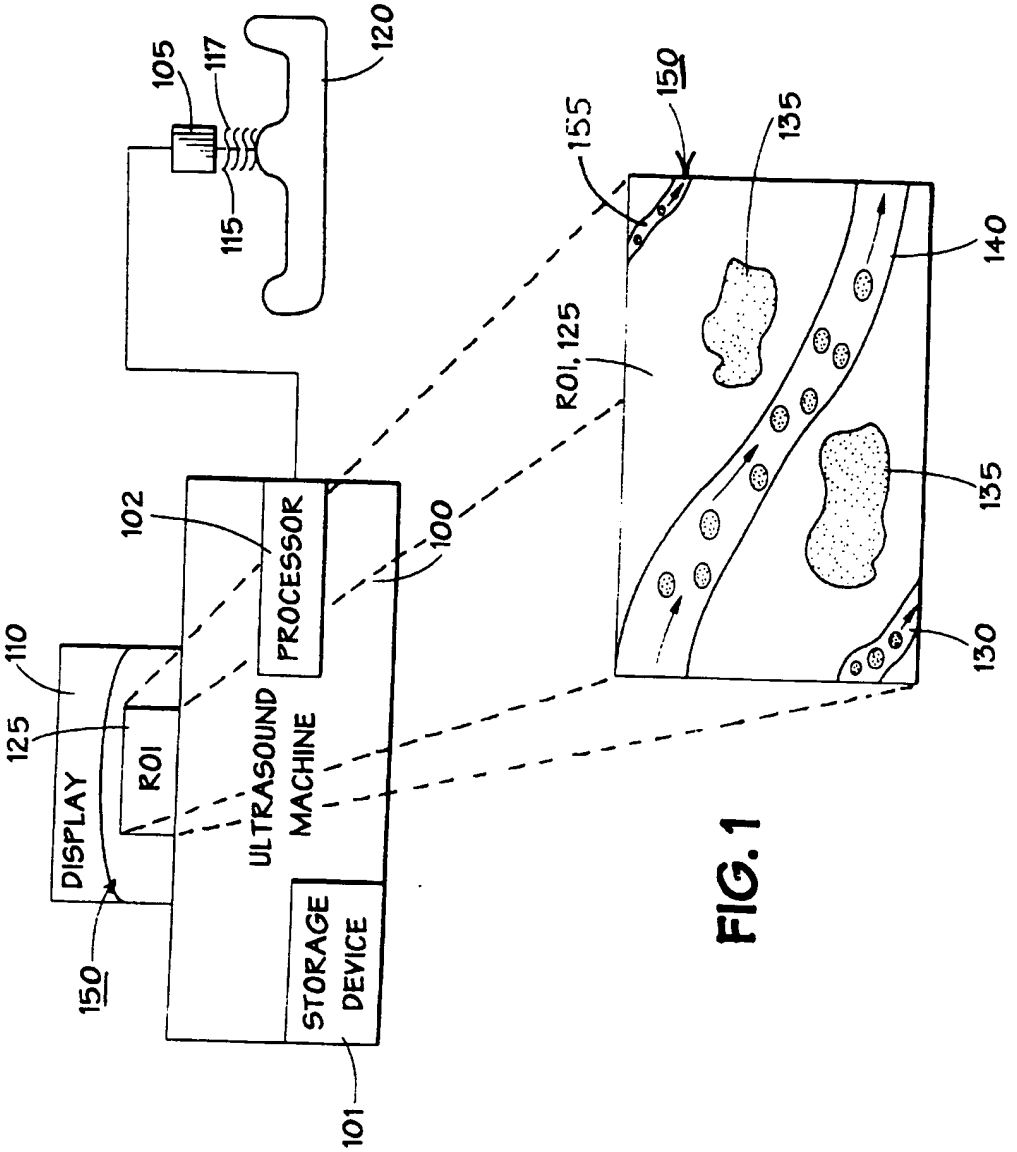
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101

FIG. 1

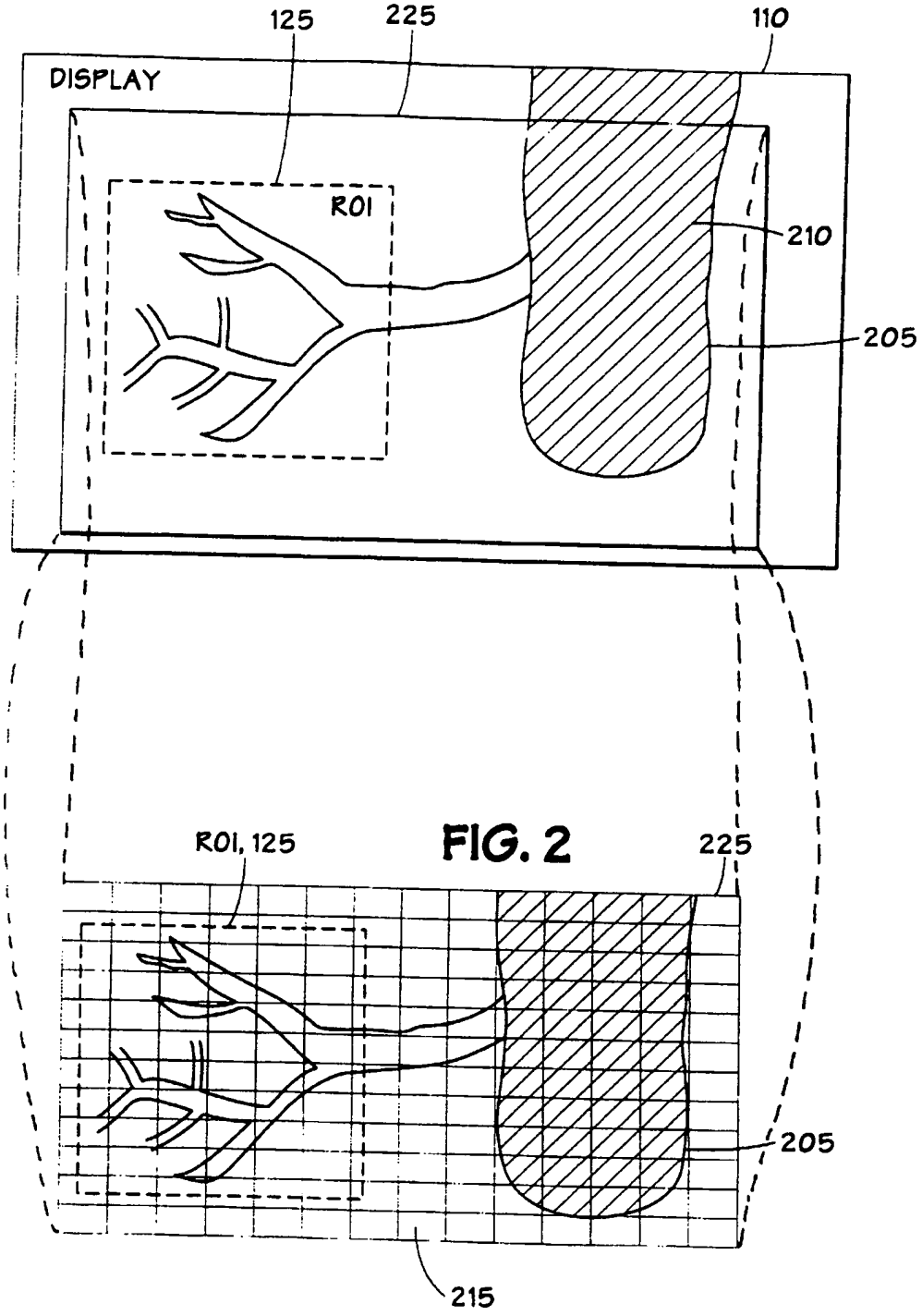

FIG. 2

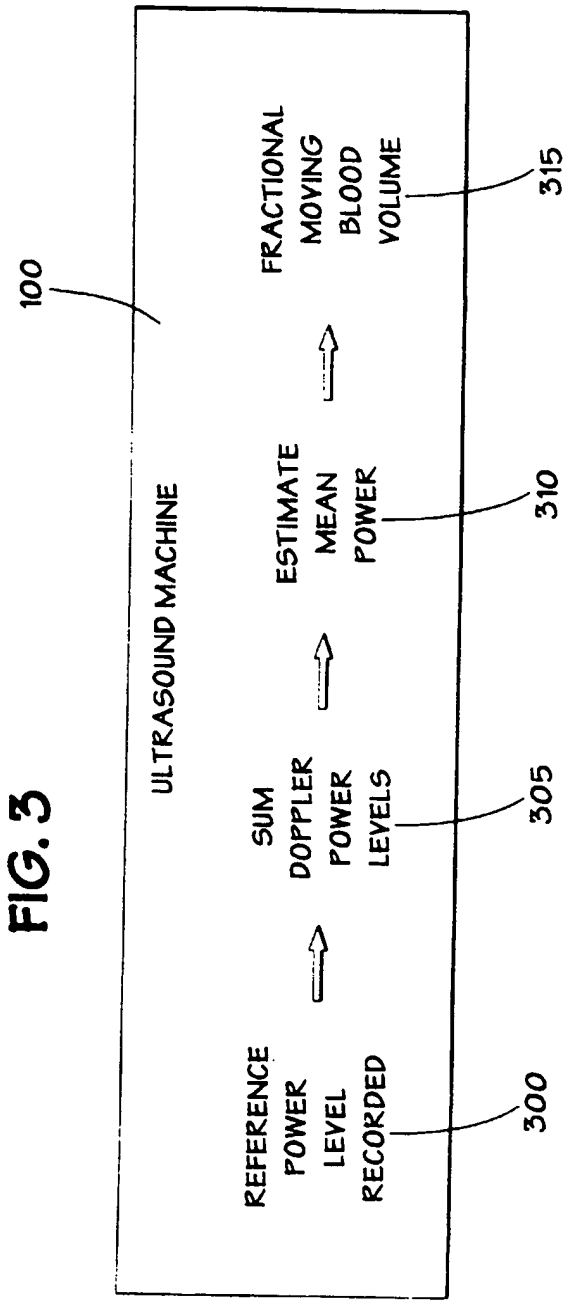
100
ULTRASOUND MACHINE
REFERENCE POWER LEVEL RECORDED
300
SUM DOPPLER POWER LEVELS
305
ESTIMATE MEAN POWER
310
FRACTIONAL MOVING BLOOD VOLUME
315

FIG. 3

FRACTIONAL MOVING BLOOD VOLUME ESTIMATION WITH POWER DOPPLER ULTRASOUND

The U.S. Government may have rights in this invention as provided by the terms of Grant Number ROI CA55076 awarded by the U.S. Public Health Service.

FIELD OF THE INVENTION

The invention relates in general to the field of medicine, and more particularly, to the use of power Doppler ultrasound in medical imaging. Specifically, the invention relates to methods of measuring the amount of moving blood in tissue in a region of interest.

BACKGROUND OF THE INVENTION

In the diagnosis of various medical conditions, it is often useful to examine soft tissues and/or blood flow within the body to show structural details of organs and blood vessels in these organs. Multiple studies have demonstrated increased vascularity (blood flow) in many tumors relative to that of normal tissue, and multiple attempts have been made to depict these differences in vascularity using ultrasonic imaging.

As well-known to those of ordinary skill, a standard real-time two-dimensional (2D) ultrasound scan typically entails the following. Referring to FIG. **1**, an operator holds a transducer **105** in one position relative to a volume of material, e.g., human tissue in a patient **120**. The transducer **105** is sometimes referred to as a scan head; it commonly has an essentially linear, one-dimensional (1D) shape, although scan heads of round or other shapes are also known, and emits a beam of ultrasound energy toward the material in a patient **120**. The ultrasound energy is reflected from the material and detected by the scan head **105**, which generates data signals representative of the detected energy.

A conventional ultrasound machine **100**, operating under the control of a processor **102** such as a microprocessor, receives and processes the resulting data from the scan head **105**. The processor **102** typically reads program instruction statements and/or data from a program storage device **101** such as read-only memory (ROM). The ultrasound machine **100** displays a 2D image of the tissue volume being scanned, e.g., on a video display terminal **110**, a film camera, or other hard copy device (not shown). Movement of the scan head **105** results in different 2D views of the tissue volume being presented.

Additional background information can be found in, e.g., Fractional Moving Blood Volume: Estimation with Power Doppler US, at pages 183 et seq. of the October 1995 edition of RADIOLOGY, which is incorporated herein by reference, and in the references cited therein.

SUMMARY OF INVENTION

The invention describes a method for quantitatively estimating the amount of moving blood a tissue contains (fractional moving blood volume) for a given region of interest (ROI) using power Doppler ultrasound. A region of interest is identified from a frozen image (i.e., a snapshot screen display created by displaying the last real-time image for a given scan). The region of interest is specified by using a pointing device (e.g., a mouse). An object that contains one hundred percent blood flow, e.g., a blood vessel, and is located at the same depth as the region of interest, but not necessarily inside the region of interest, is identified and the corresponding power designated as the reference power level. The display is adjusted to show the vessel having one hundred percent blood flow in a designated color (such as, for example, green) and all other power levels are normalized to the reference power level. The fractional blood volume is quantitatively estimated by summing the normalized Doppler power levels and dividing the sum by the number of pixels inside the region of interest.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** illustrates the objects involved in acquiring a power Doppler image of targeted tissue.

FIG. **2** illustrates specification of a region of interest and an associated reference vessel.

FIG. **3** is a flow chart that illustrates the actions performed by the ultrasound machine to generate an estimate of the fractional moving blood volume.

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

Illustrative embodiments of the invention are described below as it might be employed in the method of quantitatively estimating the fractional moving blood volume estimation with power Doppler ultrasound. In the interest of clarity, not all features of an actual implementation are described in this specification. It will, of course, be appreciated that in the development of any such actual embodiment numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which will vary from one implementation to another. Moreover, it will be appreciated that such a development effort might be complex and time-consuming, but would nevertheless be a routine undertaking for those of ordinary skill having the benefit of this disclosure.

Overview

FIG. **1** illustrates an schematic diagram of objects involved in acquiring a power Doppler ultrasound. The ultrasound machine **100** (e.g., a Spectra VST Scanner) contains both a display **110** and a scanning head **105**. The scanning head may be movable to enable various regions of the scanning subject **120** to be imaged. The scanner **100** emits ultrasound signals (incident signals) **115** which are incident upon the scanning subject **120**. Due to the variation of densities within the subject **120**, the incoming signals **115** may become reflected signals **117**, or echoes. The frequency differences between the incident signals **115** and the echoes **117** are analyzed by the ultrasound machine **100** to create an image **150**.

Within an image **150**, a region of interest (ROI) **125** may be designated. This region of interest **125** may contain several types of hard tissues (i.e., tissues in which no blood flows) **135**. A region of interest **125** may also contain tissues through which varying amounts of blood flow like **130**, **140** and **155**. The invention provides a quantitative estimate for the amount of moving blood in tissue within the region of interest **125**.

Specific Embodiments

FIG. **2** shows an enlargement of a display **110** and a window **225** which is divided into squares or pixels **215**. Since a region of interest **125** may contain multiple pixels **215**, a summation may need to be performed to provide a quantitative answer. Ultrasound is attenuated with depth and

therefore quantitative measurements made with ultrasound should be depth normalized. A reference vessel **205** containing 100 percent moving blood (e.g., a blood vessel) at the depth of the region of interest **125** may be used for normalization purposes. Normalization may be done on the display **110** by adjusting a color knob until the reference vessel **205** is approximately seventy five percent filled with a specified color **210** (e.g., green) and noting the corresponding power level (reference power level) which results in acceptable and nearly correct answers. If the depiction of the reference vessel **205** is less than about seventy five percent filled, the fractional moving blood volume is likely to be underestimated while completely filling the depiction of the reference vessel tends to overestimate the fractional moving blood volume. Hence, the judgment of the operator should be used to ensure proper normalization. This is colloquially referred to as "setting a green tag level." Any pixel value with a power level greater than the reference power level is set to the reference power level which ensures that the estimate of the fractional moving blood volume is never greater than one. Those of ordinary skill in the art will recognize that though the reference vessel **205** needs to be at the same depth in the tissue it need not necessarily be inside the region of interest **125**. It will also be apparent to those of ordinary skill in the art having the benefit of this disclosure that an ultrasound contrast agent may be used instead of a reference vessel that contains a hundred percent moving blood to estimate the fractional moving blood volume.

FIG. **3** illustrates the operations performed by the scanner once the reference power level (power level associated with the reference vessel) has been recorded at **300**. Since each pixel **215** has a color associated with it and thus an associated power also, at **305** all of the power levels for each pixel **215** in the region of interest **125** are summed to yield the total power for the region of interest. At **310**, an estimate of the mean power is calculated by dividing the total power for the region of interest by the number of pixels in the region of interest. A fractional moving blood volume for a given depth may be estimated at **315** by dividing the mean power estimate by the reference power level. The value of the fractional moving blood volume may then be shown on the display **110** or utilized in other calculations. It will be apparent to those of ordinary skill in the art having the benefit of this disclosure that a series of summations for a given region of interest may be used to yield a corresponding estimate of the fractional moving blood volume for any location in the subject **120**.

Program Storage Device

Any of the foregoing variations may be implemented by programming a suitable ultrasound machine having an appropriate processor or processors **102**. The programming may be accomplished through the use of a program storage device readable by the processor encoding a program of instructions executable by the machine for performing the operations described above. The program storage device may take the form of, e.g., one or more floppy disks; a CD ROM or other optical disk; a magnetic tape; a read-only memory chip (ROM); and other forms of the kind well-known in the art or subsequently developed. The program of instructions may be "object code," i.e., in binary form that is executable more-or-less directly by the computer; in "source code" that requires compilation or interpretation before execution; or in some intermediate form such as partially compiled code. The precise forms of the program storage device and of the encoding of instructions is immaterial here.

It will be appreciated by those of ordinary skill in the art having the benefit of this disclosure that numerous variations from the foregoing illustration will be possible without departing from the inventive concept described therein. Accordingly, it is the claims set forth below, and not merely the foregoing illustration, which are intended to define the exclusive rights claimed in this application.

What is claimed is:

1. A method of quantifying fractional moving blood volume in a tissue volume, said method comprising:

(a) receiving a signal encoding a power Doppler scan of the tissue volume, said signal including a plurality of samples;

(b) designating a region of interest at a selected depth within the tissue volume, said region of interest corresponding to a target portion of the signal;

(c) identifying, in a reference portion of the signal received from a depth within the tissue volume substantially similar to the selected depth, a reference Doppler power level associated with 100% flow;

(d) computing a mean power estimate by averaging respective target Doppler power levels of the samples in the target portion; and

(e) computing a fractional moving blood volume estimate by normalizing the mean power estimate to the reference Doppler power level.

2. The method of claim **1**, further including generating a visual display of the fractional moving blood volume estimate.

3. A method of quantifying fractional moving blood volume in a tissue volume, said method comprising:

(a) performing a power Doppler scan of the tissue volume to generate an image of the tissue volume, said image including a plurality of pixels;

(b) designating a region of interest at a selected depth within the tissue volume, said region of interest corresponding to a target portion of the image;

(c) identifying, in a reference portion of the image received from a depth within the tissue volume substantially similar to the selected depth, a reference Doppler power level associated with 100% flow;

(d) computing a mean power estimate equal to the sum of respective target Doppler power levels of pixels within the target portion divided by the number of said pixels within the target portion;

(e) computing a fractional moving blood volume estimate by normalizing the mean power to the reference Doppler power level; and

(f) generating a visual display of the fractional moving blood volume estimate.

4. The method of claim **3**, wherein said target portion and said reference portion are disjoint sets of said plurality of pixels of said image, said disjoint sets having no common pixels common to both said target portion and said reference portion.

5. The method of claim **3**, wherein said target portion and said reference portion include an overlapping portion of said image, said overlapping portion having at least one common pixel common to both said target portion and said reference portion.

6. The method of claim **5**, wherein said overlapping portion of said image has a plurality of common pixels common to both said target portion and said reference portion.

7. The method of claim **6**, wherein said plurality of common pixels includes substantially all of the pixels in said target portion.

8. The method of claim 6, wherein said plurality of common pixels includes substantially all of the pixels in said reference portion.

9. The method of claim 6, wherein said plurality of common pixels includes substantially all of the pixels in said target portion and in said reference portion.

10. An ultrasound machine comprising a signal input adapted to be coupled to an ultrasound scan head; a processor coupled to receive signals from the signal input; and a program storage device readable by the processor, tangibly embodying a program of instructions executable by the processor to perform the method of a specified one of claims 1 through 3.

11. A program storage device readable by a processor in an ultrasound machine, tangibly embodying a program of instructions executable by the processor to perform the method of a specified one of claims 1 through 3.

12. The method of claim 1, wherein said target portion and said reference portion are disjoint sets of said plurality of samples of said signal, said disjoint sets having no common samples common to both said target portion and said reference portion.

13. The method of claim 1, wherein said target portion and said reference portion include an overlapping portion of said signal, said overlapping portion having at least one common sample common to both said target portion and said reference portion.

14. The method of claim 13, wherein said overlapping portion of said signal has a plurality of common samples common to both said target portion and said reference portion.

15. The method of claim 14, wherein said plurality of common samples includes substantially all of the samples in said target portion.

16. The method of claim 14, wherein said plurality of common samples includes substantially all of the samples in said reference portion.

17. The method of claim 14, wherein said plurality of common samples includes substantially all of the samples in said target portion and in said reference portion.

18. The method of claim 1, wherein said reference Doppler power level associated with 100% flow is associated with a reference blood vessel having 100% flow and said fractional moving blood volume estimate is depth normalized to said selected depth.

19. The ultrasound machine of claim 10, wherein said program of instructions includes instructions for performing one of the method of claim 1 and a first specified one of claims 12 through 18, the method of claim 2 and a second specified one of claims 12 through 18, and the method of claim 3 and a third specified one of claims 14 through 9.

20. The program storage device of claim 11, wherein said program of instructions includes instructions for performing one of the method of claim 1 and a first specified one of claims 12 through 18, the method of claim 2 and a second specified one of claims 12 through 18, and the method of claim 3 and a third specified one of claims 4 through 9.

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